SERVICE MANUAL

CareAssist™ Bed

From Hill-Rom

Product No. P1170

For Parts or Technical Assistance **man330**
USA (800) 445-3720 Canada (800) 267-2337
International: Contact your distributor.

CareAssist™ Bed Service Manual

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NOTES:

1

Chapter 1 Introduction

Purpose

This manual provides requirements for the CareAssist™ Bed normal operation and maintenance. It also includes parts lists (in chapter 5) for ordering replacement components.

Audience

This manual is intended for use by only facility-authorized personnel. Failure to observe this restriction can result in severe injury to people and serious damage to equipment.

Organization

This manual contains seven chapters.

Chapter 1: Introduction

In addition to a brief description of this service manual, chapter 1 also provides a product overview.

Chapter 2: Troubleshooting Procedures

Repair analysis procedures are contained in this chapter. Use these procedures to gather information, identify the maintenance need, and verify the effectiveness of the repair.

Chapter 3: Theory of Operation

This chapter describes the application of the mechanical and electrical systems employed in this product.

Chapter 4: Removal, Replacement, and Adjustment Procedures

Chapter 4 contains the detailed maintenance procedures determined necessary in chapter 2.

Chapter 5: Parts List

This chapter contains the warranty, part-ordering procedure, and illustrated parts lists.

Chapter 6: General Procedures

Cleaning, preventive maintenance, and other general procedures are described in this chapter.

Chapter 7: Accessories

A list of additional products, that can be used in conjunction with the CareAssist™ Bed, is available in chapter 7. Installation procedures for these accessories are also included.

Document Symbol Definition

This manual contains different typefaces and icons designed to improve readability and increase understanding of its content.

Note the following examples:

- Standard text—used for regular information.
- **Boldface text**—emphasizes a word or phrase.
- **NOTE:**—sets apart special information or important instruction clarification.
- The symbol below highlights a WARNING or CAUTION:

Figure 1-1. Warning and Caution

  - A WARNING identifies situations or actions that may affect patient or user safety. Disregarding a warning could result in patient or user injury.
  - A CAUTION points out special procedures or precautions that personnel must follow to avoid equipment damage.
- The symbol below highlights a CAUGHT HAZARD WARNING:

Figure 1-2. Caught Hazard Warning

- The symbol below highlights a CHEMICAL HAZARD WARNING:

Figure 1-3. Chemical Hazard Warning

- The symbol below highlights an ELECTRICAL SHOCK HAZARD WARNING:

Figure 1-4. Electrical Shock Hazard Warning

Standard Features

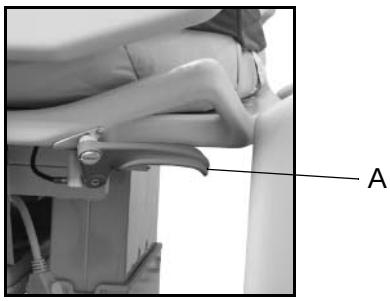
Emergency CPR Controls

The emergency CPR control handles are located at the head end of the bed, under each corner of the sleep deck

To Activate

- Pull the CPR control handle (A) with one hand (see figure 1-5 on page 1-4).
- Let the head section come to a stop in the flat position.
- Release the CPR control handle when the head section is flat.

Figure 1-5. CPR Release



m330_022

The head section actuator is automatically re-enabled after the CPR control handle is released.

Caregiver Siderail Controls

The caregiver siderail controls are located on the outside of the head siderails.

Enable Control

The Enable control must be pressed before the Trendelenburg and Reverse Trendelenburg controls will operate. The Enable indicator stays on for approximately 60 seconds.

m330_014

To Activate

- Press the *Enable* control. The Enable control is active for approximately 60 seconds.
- During the 60-second period, you may activate the Trendelenburg and Reverse Trendelenburg controls without pressing the Enable control again. The 60-second period will start over when another Trendelenburg control is pressed.

The following caregiver controls can be activated without activating the Enable control: Bed Up/Down, Head Up/Down, Knee Up/Down, Nurse Call, Chair Positioning, Foot Up/Down, and Bed Flat.

Bed Up/Down

m330_010

Head Up/Down

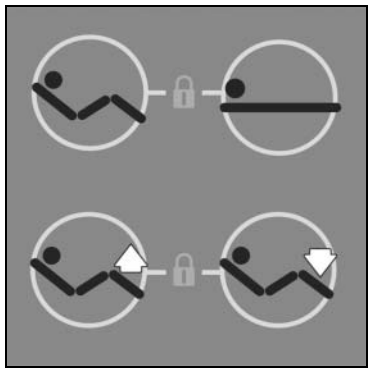
m330_011

Knee Up/Down

m330_012

Nurse Call

m330_020



Chair Positioning, Foot Up/Down and Bed Flat

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Lockout Control

m330_019

The Lockout control, located on the caregiver siderail control panel, disables the bed articulation functions. The Lockout control affects only the functions inside the blue area of the caregiver siderail control panel.

To Activate

- Press and hold the *Lockout* control, and then press the desired control. Both patient and caregiver controls are locked out. A solid LED on the control panel illuminates continuously when a lockout is activated.
- After the desired control is locked out, activate the locked out control to verify the lockout is activated. If the desired control is not locked out, contact your facility maintenance personnel.

To Deactivate

Press and hold the *Lockout* control, and then press the locked out control.

The Lockout control disables only **articulation** controls, not Nurse Call. No movement of the unit is allowed, except for emergency CPR, Trendelenburg, and Reverse Trendelenburg.

Bed Up/Down Control

m330_010
m330_008

The Bed Up/Down controls are located on the head siderails.

To Activate

- Press and hold the *Bed Up* control to raise the bed. Release the control when the desired height is reached.
- Press and hold the *Bed Down* control to lower the bed. Release the control when the desired height is reached.
- To disable the Bed Up/Down control activate its *Lockout* control.

NOTE:
When the bed is **not** in the low-low position, an indicator next to the Up/Down control illuminates.

Head Up/Down Control

m330_011

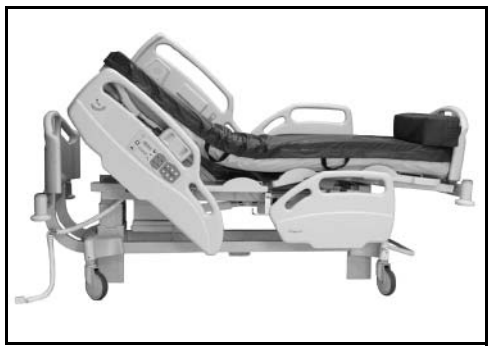
Using the Head Up/Down controls are located on the head siderails.

The head section maximum travel is 65°.

To Activate

- Press and hold the *Head **Up*** Control to raise the head section.
- Press and hold the *Head **Down*** Control to lower the head section.

Automatic Contour Feature



m330_093

The automatic contour feature is activated by using the Head Up control.

The automatic contour feature raises the head section and the knee section simultaneously.

The automatic contour feature is active only when both the head section and knee section are not locked out.

NOTE:
When the head section is locked out, the knee section can be raised or lowered by using the Knee Up/Down control.

Knee Up/Down Control

m330_012

The Knee Up/Down controls are located on the head siderails.

The knee section has a maximum travel of 35°.

To Activate

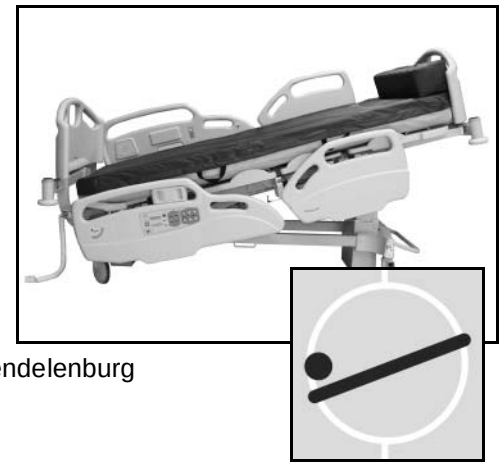
- Press and hold the *Knee Up* control to raise the knee section.
- Press and hold the *Knee Down* control to lower the knee section.

The automatic contour feature does not work when using only the Knee Up/Down controls.

Trendelenburg and Reverse Trendelenburg Controls

The powered Trendelenburg and Reverse Trendelenburg controls can be activated at any bed height and are located on the head siderails.

The Trendelenburg and Reverse Trendelenburg Line-of-Site® Angle Indicators are located in the foot end siderails.



Trendelenburg

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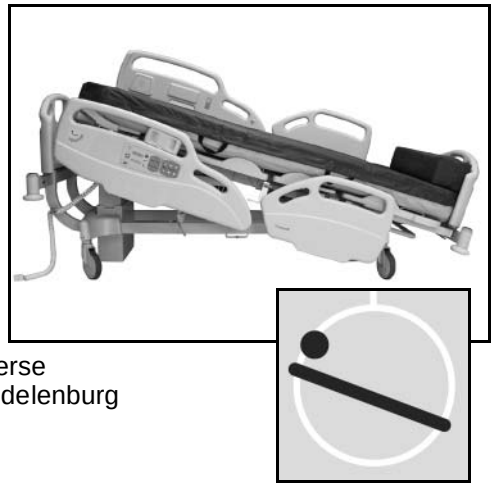
m330_015

To Activate

- Press the *Enable* control.
- Press and hold the *Trendelenburg* control to go into the Trendelenburg position.
- Press and hold the *Reverse Trendelenburg* control to go into the Reverse Trendelenburg position.
- Press the opposite control to return to the flat position.



Reverse Trendelenburg

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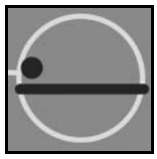
Bed Flat Control



The Bed Flat control, located on the head siderails, only returns the sleep deck to a flat position, it **does not** change the angle of the bed.

m330_038

To Activate

Press and hold the *Bed Flat* control. When all sections are flat, the system stops.

Dining Chair™ Position

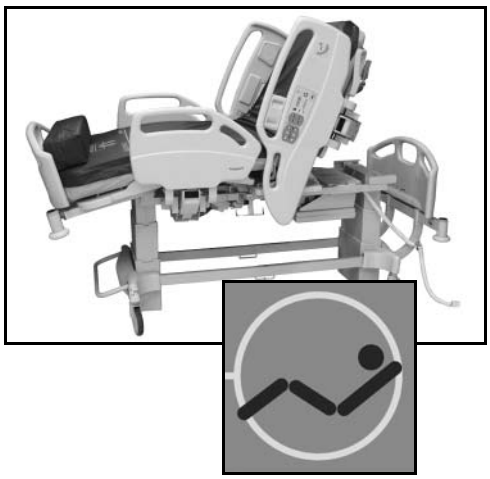
The Dining Chair™ Position controls are located on the outside of the head siderails. When activated, the bed will articulate to a maximum of 65° for the head section, 20° for the knee section, and -23° for the foot section.

To Activate

- Set the brake.
- Press the Dining Chair™ Position control. The sleep deck transitions to the chair position.

To Return to Flat Position

- Press the *Bed Flat* control. The sleep deck returns to the flat position.
- Press the *Trendelenburg* control. The bed frame to the level position.



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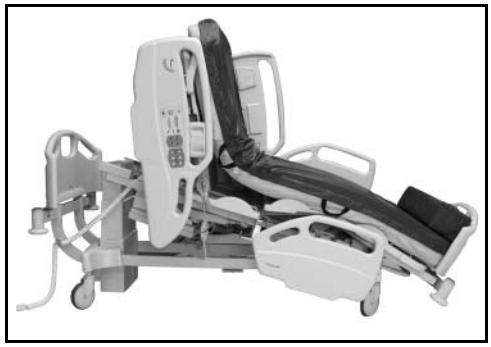
m330_037

FullChair® Patient Positioning Mechanism



m330_094

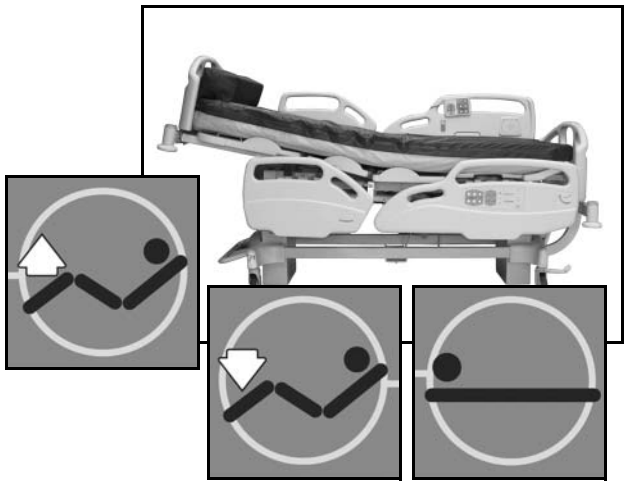
To Activate

- Set the brake.
- Press the *Dining Chair™ Position* control. The patient deck transitions to the chair position.
- When the bed has finished traveling, press the *Enable* control.
- Press the *Reverse Trendelenburg* control until the desired position is obtained.

To Return to Flat Position

- Press the *Bed Flat* control. The sleep deck returns to the flat position.
- Press the *Trendelenburg* control. The bed frame to the level position.

Vascular Position



m330_088
m330_039
m330_040
m330_038

To Activate

- Raise the knee section to 20° or more.
- Press the *Foot Up* control.
- Adjust the knee section as needed to maintain alignment with the foot section.

To Return to Flat Position

Press the *Foot Down* control or the *Bed Flat* control.

Battery Control

m330_013

The battery function is **available only** when the bed is **not connected** to AC power and is located on the head siderails.

To Activate

- Unplug the bed from its power source.
- Press the *Battery* control to activate the battery.

When the battery charge level is low and an electrical function is activated, an alarm will sound indicating that the battery needs recharging. The ongoing bed movement will be completed.

Plug the bed into an appropriate power source to automatically charge the battery.

WARNING:
The bed must remain connected to the mains power supply until the charge LED turns off (charge time is approximately 10 hours, for a completely discharged battery). Failure to do so could result in the inability to operate the bed when power is unavailable.

If the indicator is flashing, it indicates a low battery, and is charging. If the indicator is not illuminated and AC power is connected, the battery is fully charged. When disconnected from AC power, the indicator will not be illuminated.

Standard Casters

The CareAssist™ Bed is equipped with 6" (150 mm) single wheel casters.

m330_024

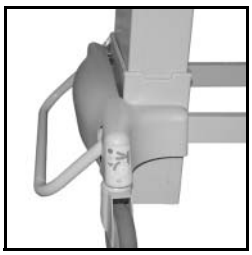
Brake and Steer Control

WARNING:
Unless transporting the patient, always set the brakes when the unit is occupied. Reconfirm that the brakes are set before any patient transfer. Failure to do so may result in personal injury or equipment damage.

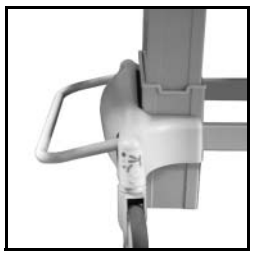
The brake and steer control is located under the foot section. There are three positions: Brake, Neutral, and Steer. The brake position to keeps the bed from moving. The neutral position allows the bed to be moved sideways in rooms or small enclosed areas. The steer position to allows the bed to move in a straight line.

When the bed is plugged into AC power and the brakes are not set, an alarm sounds until the brakes are set or AC power is removed.

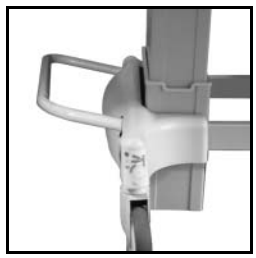
To Activate



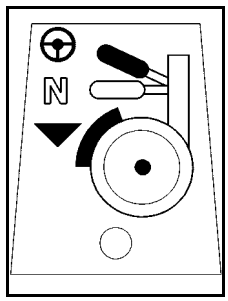
Brake
Using your foot, step down on the brake/steer bar until it stops.



Neutral
Using your foot, lift the brake/steer bar until it travels to the middle detent.



Steer
Using your foot, lift the brake/steer bar to the full up position.

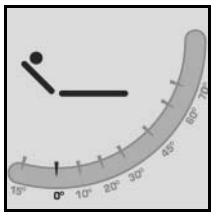


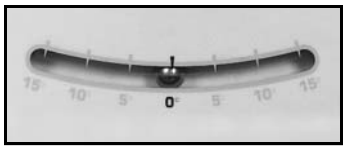
Brake Position Label
Located on the base frame near the casters.

m330_025
m330_026
m330_027
m330_058

Head and Foot Siderails

The head siderail contains the Line-of-Site® Head Angle Indicators and the foot siderail contains the Trendelenburg/Reverse Trendelenburg Line-of-Site® Angle Indicators.





m330_021
m330_041

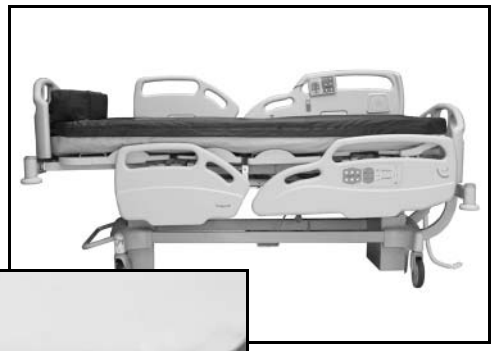
To Raise a Siderail

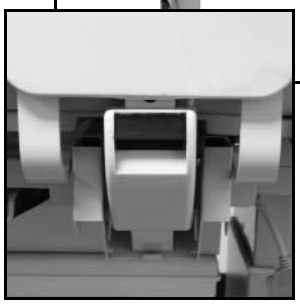
- Pull the siderail up until it latches into the locked position. A **click** will be heard when it latches into the locked position.
- Once the **click** is heard, gently pull on the siderail to make sure it is latched properly.

m330_083

To Lower a Siderail

Grasp the release handle and pull up. The siderail lowers automatically.





m330_086
m330_023

Headboard

m330_049

The headboard is located at the head end of the bed. It attaches to the head end of the frame. It **does not** articulate with the sleep deck.

To Remove

Grasp the headboard, and lift it straight up.

To Install

- Position the headboard pins over the sockets in the frame.
- Push the headboard down until the bottom rests on the frame.

Footboard

m330_097

The footboard is located at the foot end of the bed. It attaches to the articulating foot section and remains perpendicular to the surface of the foot section at all times.

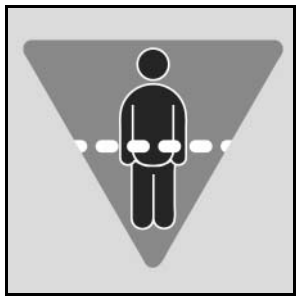
To Remove

Grasp the handles on the footboard, and lift it straight up.

To Install

- Insert the pins of the footboard into the sockets in the articulating frame.
- Push the footboard down until it rests on the deck.

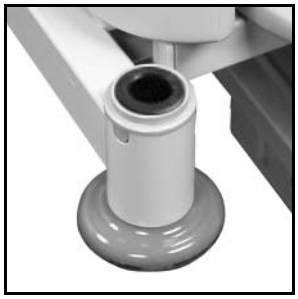
Patient Position Indicator



m330_030

The patient position indicator is located on the inside of the head siderails. The indicator is used to help provide optimal, ergonomic patient positioning.

Equipment Sockets



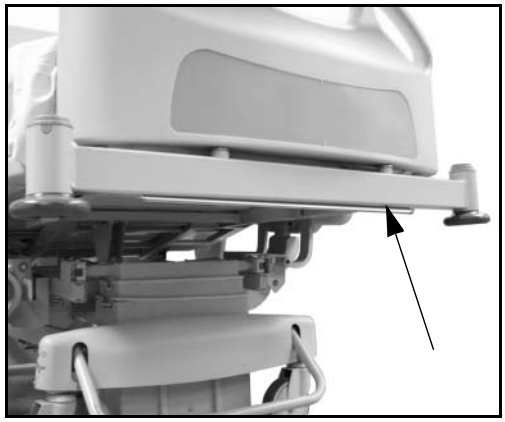
m330_033

There are four equipment sockets, one at each corner, for the attachment of accessories.

The equipment sockets can be used to mount IV poles, ISS poles, traction equipment, and oxygen tank holders.

NOTE:
The IV poles and ISS poles require an adapter to be installed prior to use.

Foot Extension



m330_050

The foot extension allows the foot section to extend 4" (100 mm).

To Extend the Foot Section

- Grasp the control bar located under the bed frame, below the footboard.
- Push up on the control bar.
- Pull the foot section out, then release the control bar.
- Continue to pull on the foot section until it locks into position.
- Place the mattress foot pad between the footboard and the mattress.

To Retract the Foot Section

- Remove the mattress extender pad.
- Grasp the control bar located under the bed frame, below the footboard.
- Push up on the control bar.
- Push the foot section toward the head end of the bed, then release the control bar.
- Push the foot section in until it locks into position.

Standard Patient Controls

m330_042

The patient controls are located on the patient pendant, which can be installed in any siderail.

The standard patient controls include: Head Up/Down and Knee Up/Down. They operate in the same manner as the caregiver siderail controls.

If the caregiver has locked out a bed function, that same function is locked out on the patient pendant.

To Install the Pendant into the Siderail

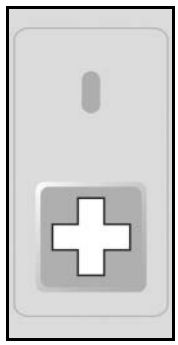
- Position the pendant next to the opening in the siderail.
- Insert the top edge of the pendant into the siderail so it engages the upper section of the siderail.
- Rotate the lower edge of the pendant in until it **clicks** into place inside the siderail.

m330_051
m330_052

To Remove the Pendant from the Siderail

Gently pull on the lower edge of the pendant until it pops out of the siderail.

Nurse Call Control (Optional)



m330_020

The Nurse Call control is located on the outside and inside of the head siderails.

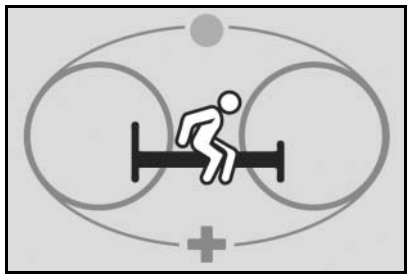
To Activate

- Press a *Nurse Call* control.
- When the nurses station acknowledges the nurse call, the indicator on the Nurse Call control will flash.
- When the nurses station's communication line is open, the indicator stops flashing and illuminates continuously.

- Speak into the speaker/microphone located on the inside of the head siderails.

NOTE:
The Enable control **does not** need to be activated prior to pressing a Nurse Call control. The Nurse Call controls are always active. The Nurse Call controls cannot be locked out.

Bed Exit Control (Optional)



m330_017

The Bed Exit control is located on the outside of both head siderails.

To Activate

- Make sure the patient is on the bed.
- Simultaneously press **both** buttons on the *Bed Exit* control on either head siderail. The indicator will illuminate when armed.

When activated, the Bed Exit sounds a local alarm when the patient exits the bed. If the bed is equipped with the SideCom® Communication System, and it is connected to the facility, a signal is sent to the nurses station when the Bed Exit alarm sounds.

To Reset After the Alarm Sounds

- Make sure the patient is on the bed.
- Simultaneously press **both** buttons on the Bed Exit control on either head siderail to turn the system off.
- Simultaneously press **both** buttons on the Bed Exit control on either head siderail to turn the system on. The indicator will illuminate when armed.

To Deactivate

Simultaneously press **both** buttons on the Bed Exit control on either head siderail.

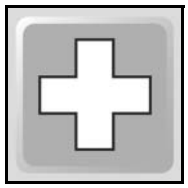
Patient Controls (Optional)

The optional patient controls are located on the patient pendant.

m330_028

Nurse Call Control (Optional)

The Nurse Call control is located on the inside of the head siderails and on the patient pendant. The patient Nurse Call control functions in the same manner as the caregiver Nurse Call control (see “Nurse Call Control (Optional)” on page 16).



m330_018

Room Light Control (Optional)

The room light control allows the patient to turn the room light off and on.

m330_043

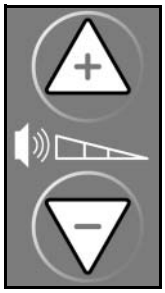
Reading Light Control (Optional)

The reading light control allows the patient to turn the reading light off and on.

m330_044

Volume Control (Optional)

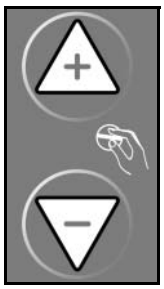
The volume control allows the patient to adjust the volume of the television or radio in the room.



m330_047

Channel Control (Optional)

The channel control allows the patient to change channels on the television or stations on the radio in the room.



m330_048

Music Control (Optional)

The music control allows the patient to turn on and off the radio in the room.

m330_045

Television Control (Optional)

The television control allows the patient to turn on and off the television in the room.

m330_046

Physical Description

For CareAssist™ Bed specification, see table 1-1 on page 1-20 through table 1-9 on page 1-23.

Table 1-1. Dimensions

Feature	Dimension
Total length	100" (254 cm)
Maximum width (siderails stored)	40" (102 cm)
Maximum width (siderails up)	40" (102 cm)
Mattress dimensions:	
Mattress width	36.0" (91.4 cm)
Mattress length	80" (203.2 cm)
Caster size	6" (15 cm)
Total weight	420 lb (191 kg) without surface, options, or accessories

Table 1-2. Specifications

Feature	Dimension
Head section inclination (maximum)	65°
Knee section inclination (maximum)	20°
Foot section inclination (maximum)	-23°
Maximum height (to top of sleep deck)	32.5" (82.6 cm)
Minimum height (to top of sleep deck)	16.75" (42.55 cm)
Trendelenburg position (maximum)	16°
Safe working load (safe working load includes: patient, accessories, mattress, and etc.)	400 lb (181 kg)
Siderail opening size	4.34" (11.02 cm)
Distance between siderails	< 2.3" (58.4 mm)

Table 1-3. Environmental Conditions for Transport and Storage

Condition	Range
Temperature	-40°F to 122°F (-40°C to 50°C)
Relative humidity	95% non-condensing
Pressure	50 kPa to 106 kPa

Nurse Call Connection Requirements

For information about the Nurse Call connection requirements, refer to the *SideCom® Communication System Design and Application Manual* (ds059).

Mattress Flammability

The sleep surface mattress meets the following specifications:

- CAL TB-117, *Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture* (foam)
- 16 CFR 1632, *Standard for the Flammability of Mattresses and Mattress Pads*
- CAL TB-129, *Flammability Test Procedures for Mattresses for Use in Public Buildings* (models with fire barrier only)
- BFD IX-II, *Boston Fire Department Mattress Fire Test* (models with fire barrier only)

Table 1-4. Environmental Conditions for Use

Condition	Range
Temperature	32°F to 104°F (0°C to 40°C) ambient temperature
Relative humidity range	30% to 85% non-condensing
Atmospheric Pressure	70 kPa to 106 kPa

Table 1-5. AC Power Requirements

Condition	Range
Rated voltage	120 V~
Power/input	4.0 A
Frequency	60 Hz

Table 1-6. Fuse Specifications

Condition	Range
Battery fuse	10 A, 32 V~, ATO
Mains fuse	2 each 2.5 A, 250 V~, 5 x 20 mm, UL 198G Slo-Blo®[a] or equivalent

a. Slo-Blo® is a registered trademark of Littlefuse, Inc.

Table 1-7. Regulation, Standards, and Codes

The CareAssist™ Bed is designed and manufactured according to the following equipment classifications and standards:

Technical and Quality Assurance Standards	UL 60601-1 CSA®[a] C22.2 No. 601.1 IEC 60601-2-38 EN 60601-1 IEC 60601-1-2 EN ISO 9001 and EN 13485
Equipment Classification per IEC 60601-1	Class I equipment, internally powered equipment
Degree of Protection Against Electric Shock	Type B
Degree of Protection Against Ingress of Water	Protection against spraying or splashing water- IPX4
Degree of Protection Against the Presence of Flammable Anaesthetic Mixtures	Not for use with flammable anaesthetics.
Mode of Operation (120 V)	Continuous operation with intermittent loading, 3 minutes ON/27 minutes OFF
Sound level (measured 1 meter from patient's ear)	< 54 dBA

a. CSA® is a registered trademark of Canadian Standards Association, Inc.

Table 1-8. Electromagnetic Emissions Guidance

Guidance and Manufacturer's Declaration—Electromagnetic Emissions The CareAssist™ Bed model P1170 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P1170 should make sure it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment—Guidance**
RF emissions CISPR 11	Group 1	The model P1170 uses RF energy only for its internal functions. Therefore, its RF emissions are low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	The model P1170 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Not Applicable	
Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Not Applicable	

Table 1-9. Electromagnetic Immunity Guidance

Guidance and Manufacturer's Declaration—Electromagnetic Emissions The CareAssist™ Bed model P1170 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P1170 should make sure it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment—Guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV Contact ± 8 kV Air	± 6 kV Contact ± 8 kV Air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Radiated RF IEC 61000-4-3	3 Vrms 80 MHz to 2.5 GHz	3 Vrms 80 MHz to 2.5 GHz	Portable and mobile RF communications equipment should not be used at close distances to the P1170 bed. (See Note 2)
Electrical Fast Transient/Burst IEC 61000-4-4	± 2 kV on Power Supply Lines ± 1 kV on Input/ Output Lines	± 2 kV on Power Supply Lines ± 1 kV on Input/ Output Lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV Differential Mode (Line-Line) ± 2 kV Common Mode (Line-Ground)	± 1 kV Differential Mode (Line-Line) ± 2 kV Common Mode (Line-Ground)	Mains power quality should be that of a typical commercial or hospital environment.

Guidance and Manufacturer's Declaration—Electromagnetic Emissions The CareAssist™ Bed model P1170 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P1170 should make sure it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment—Guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150 kHz to 80 MHz	Portable and mobile RF communications equipment (cell phones) should not be used at close distances to the P1170 bed. (See Note 2)
Power Frequency Magnetic Fields IEC 61000-4-8	3 A/m	3 A/m	The power frequency magnetic field should be measured in the intended installation location to assure it is sufficiently low.
Voltage Dips, Short Interrupts, & Variations On Power Supply Lines IEC 61000-4-11	< 5% U_T (95% dip in U_T for 0.5 cycles) < 40% U_T (60% dip in U_T for 5 cycles) < 70% U_T (30% dip in U_T for 25 cycles) < 5% U_T (95% dip in U_T for 5 seconds) (See Note 1)	< 5% U_T (95% dip in U_T for 0.5 cycles) < 40% U_T (60% dip in U_T for 5 cycles) < 70% U_T (30% dip in U_T for 25 cycles) < 5% U_T (95% dip in U_T for 5 seconds)	Mains power quality should be that of a typical commercial or hospital environment. If operation is required during an extended power outage or interruption, the model P1170 should be switched to operate from the backup battery.
Note 1: U_T is the AC mains voltage prior to application of the test level.			
Note 2: The compliance levels in the ISM frequency range 150 kHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into the patient area. However, emission limits, IEC 60601 test levels, and tests specified in IEC 60601-1-2:2001 do not address electromagnetic compatibility of electrical equipment at very close distances. Care should always be exercised when using any electrical or RF equipment in the immediate patient area.			

Model Identification

For CareAssist™ Bed model identification, see table 1-10 on page 1-25.

Table 1-10. Model Identification

Model Number	Description
P1170	CareAssist™ Bed

Safety Tips

WARNING:
Only facility-authorized personnel should service the CareAssist™ Bed. Servicing performed by unauthorized personnel could result in personal injury or equipment damage.

WARNING:
Adhere to appropriate infection control policies and procedures. Failure to do so could result in the spread of infection.

WARNING:
To prevent injury from sharp edges and rough surfaces, wear protective gloves.

WARNING:
To reduce the risk of eye injury, wear eye protection.

WARNING:
Do not work under an unsupported load. Install appropriate temporary supports. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

CAUTION:
Do not use harsh cleaners, solvents, or detergents. Equipment damage could occur.

CAUTION:
Do not use silicone-based lubricants. Equipment damage could occur.

CAUTION:
To prevent component damage, make sure that your hands are clean, and **only** handle the P.C. board by its edges.

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

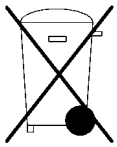
CAUTION:
For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

Warning and Caution Labels

Figure 1-6. Warning and Caution Labels

m330_098

Safe Working Load



m330_057

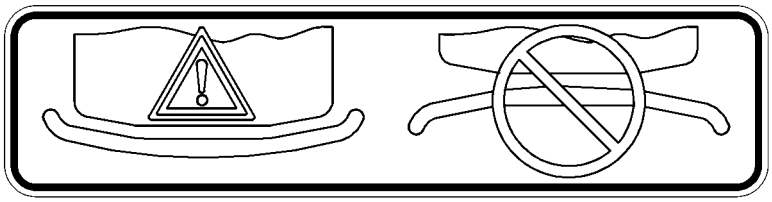
Do Not Throw Away

m330_063

No Oxygen Tents

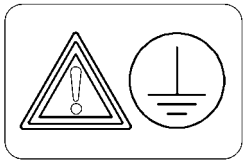
m330_055

Do Not Stack



m330_127

Footboard Position Indicator



m330_128

Grounding Point Position

Chapter 2
Troubleshooting Procedures

2

Getting Started

WARNING:
Only facility-authorized personnel should service the CareAssist™ Bed. Servicing by unauthorized personnel could result in personal injury or equipment damage.

Begin each procedure in this chapter with step 1. Follow the sequence outlined (each step assumes the previous step has been completed). In each step, the normal operation of the product can be confirmed by answering **Yes** or **No** to the statement. Your response will lead to another step in the procedure, a repair analysis procedure (RAP), or a component replacement. If more than one component is listed, replace them in the given order.

To begin gathering information about the problem, start with **Initial Actions**.

To isolate or identify a problem and to verify the repair after completing each corrective action (replacing or adjusting a part, seating a connector, etc.), perform the **Function Checks**.

To verify the repair, perform the **Final Actions** after the Function Checks.

If troubleshooting procedures do not isolate the problem, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

Initial Actions

Use Initial Actions to gather information from operators concerning problems with the CareAssist™ Bed. Note the symptoms or other information concerning the problem that the operator describes. This information helps identify the probable cause.

1. Someone who can explain the problem is available.

   Yes **No**
   ↓ → Go to "Function Checks" on page 2-4.

2. Ask this person to demonstrate or explain the problem. The problem can be duplicated.

   Yes **No**
   ↓ → Go to "Function Checks" on page 2-4.

3. The problem is a result of improper operator action.

   Yes **No**
   ↓ → Refer to table 2-1 on page 2-2, or go to "Function Checks" on page 2-4.

4. Instruct the operator to refer to the procedures in the CareAssist™ Bed. Perform the "Function Checks" to ensure proper operation of the CareAssist™ Bed.

Problem/Solution Table

If the problem can be easily identified, use the following table to determine the appropriate troubleshooting procedure.

Table 2-1. Problem/Solution Table

Problem	Solution
No Functions Work	RAP 2.1
Lockout Malfunction	RAP 2.2
Hilow Malfunction	RAP 2.3
Knee Section Malfunction	RAP 2.4
Head Section Malfunction (excluding Automatic Contour)	RAP 2.5
Battery Backup Malfunction	RAP 2.6
Foot Section Malfunction	RAP 2.7
Trendelenburg/Reverse Trendelenburg Malfunction	RAP 2.8

Problem	Solution
Bed Connected to AC Power, Brakes Not Applied Detection Malfunction	RAP 2.9
CPR Malfunction	RAP 2.10
Braking Malfunction	RAP 2.11
Steering Malfunction	RAP 2.12

Function Checks

1. The "Initial Actions" have been performed.

   Yes **No**
   ↓ → Go to “Initial Actions” on page 2-2.

2. Set the brakes, raise and lock the siderails in the high position. Plug in the power cord into an appropriate power source.

3. Operate the trendelenburg function.

   This function works.

   Yes **No**
   ↓ → Go to RAP 2.1.

4. Lock at least one bed function (such as the head section).

   The corresponding indicator is illuminated.

   Yes **No**
   ↓ → Go to RAP 2.2.

5. Lock out all bed functions.

   All of the lock out indicators illuminate (except the Bed Not Down Indicator).

   Yes **No**
   ↓ → Go to RAP 2.2.

6. Unlock all of the functions.

   All of the lock out indicators go off (except the Bed Not Down Indicator).

   Yes **No**
   ↓ → Go to RAP 2.2.

7. Press the *Bed Up* control.

   The bed rises to the high position without stopping or an audible alarm sounding.

   Yes **No**
   ↓ → Go to RAP 2.3.

8. Press the *Bed Down* control.

   The bed goes down to the low position without stopping or the audible alarm sounding. In addition, the "Bed Not Down" indicator goes off when the bed reaches the lowest position.

Yes **No**
↓ → Go to RAP 2.3.

9. Press the *Knee Up* control.

   The knee section rises to the high position without stopping or the audible alarm sounding.

   Yes **No**
   ↓ → Go to RAP 2.4.

10. Press the *Knee Down* control.

    The knee section goes down to the low position without stopping or the audible alarm sounding.

    Yes **No**
    ↓ → Go to RAP 2.4.

11. Press the *Head Up* control.

    The head section rises to the high position without stopping or the audible alarm sounding.

    Yes **No**
    ↓ → Go to RAP 2.5.

12. Press the *Head Down* control.

    The head section goes down to the low position without stopping or the audible alarm sounding (do not consider the knee section motor).

    Yes **No**
    ↓ → Go to RAP 2.5.

13. Press the *Head Up* control. (verifying Automatic Contour)

    The head section and knee section rise simultaneously, then the knee section stops at an angle approaching 17° while the head section continues to rise to its highest position.

    Yes **No**
    ↓ → Go to RAP 2.5.

14. Press the *Head Down* control.

    The head section goes down, then the knee section continues to drop when the head section reaches low position.

    Yes **No**
    ↓ → Go to RAP 2.5.

15. Unplug the power from the power source, and test the functions checked in step 12 to step 14.

    The bed functions operate properly.

    Yes **No**
    ↓ → Go to RAP 2.6.

16. Press the *Knee Up* control until it reaches the high position and then press the *Foot Up* control.

    The foot section rises to the high position without stopping or the audible alarm sounding.

    Yes **No**
    ↓ → Go to RAP 2.7.

17. Press the *Foot Down* control.

    The foot section drops to the low position without stopping or the audible alarm sounding.

    Yes **No**
    ↓ → Go to RAP 2.7.

18. Press the *Knee Down* control until knee section is in the horizontal position. Press the *Dining Chair™ Position* control.

    The head section and knee section rise until the required position is reached.

    Yes **No**
    ↓ → Go to RAP 2.5.

19. Press the *Bed Flat* control.

    The head section, knee section and foot section return to the horizontal position.

    Yes **No**
    ↓ → Go to RAP 2.5.

20. Press the *Bed Up* control until the intermediate position is reached, and then operate the *Trendelenburg* control.

    The sleep surface gradually tilts to maximum Trendelenburg without any problem or abnormal noise.

    Yes **No**
    ↓ → Go to RAP 2.8.

21. Press the *Reverse Trendelenburg* control.

The sleep surface gradually tilts to maximum Reverse Trendelenburg without any problem or abnormal noise.

Yes **No**
↓ → Go to RAP 2.8.

22. Plug the bed into an appropriate power source. Set the brakes to the neutral position.

    An audible alarm can be heard.

    Yes **No**
    ↓ → Go to RAP 2.9.

23. Set the brakes.

    The audible alarm stops sounding.

    Yes **No**
    ↓ → Go to RAP 2.9.

24. Press the *Head Up* control until the section reaches the high position.

NOTE:
Someone should be lying on the bed so that this test can be carried out conclusively.

Pull one of the CPR control handles.

The head section descends quickly to the mid position, then slows until the horizontal position is reached. The movement occurs without any problem or abnormal noise. Repeat for the other CPR control handle.

Yes **No**
↓ → Go to RAP 2.10.

25. Release the CPR control handle, and press the *Head Up* control to check that the head section motor drive mechanism is working correctly.

    The head section rises without any problem or abnormal noise.

    Yes **No**
    ↓ → Go to RAP 2.10.

26. Try to move the bed with the brake still applied.

    The four wheels are locked and prevent any movement.

    Yes **No**
    ↓ → Go to RAP 2.11.

27. Set the brakes to Steer, and move the bed far enough to lock the steer caster into position.

NOTE:
The Brake Not Set alarm will sound.

The steer caster locks into position.

Yes **No**
↓ → Go to RAP 2.12.

28. Go to “Final Actions” on page 2-9.

Final Actions

1. Perform the required preventive maintenance procedures. See “Preventive Maintenance Checklist” on page 6-10.

2. Complete all required administrative tasks.

2.1 No Functions Work

NOTE:
This procedure assumes that no functions work from the pendant or caregiver controls on the siderails.

SHOCK HAZARD:
The potential for electrical shock exists with electrical equipment. Failure to follow facility protocols may result in death or serious personal injury.

1. Verify the two AC power fuses and one interface P.C. board in-line cable fuse are serviceable.

   The fuses are serviceable.

   Yes **No**
   ↓ → Replace the fuses (refer to procedure 4.16), and then go to “Function Checks” on page 2-4.

2. Verify all the cables on the AC power P.C. board and motor control P.C. board are connected correctly.

   All cables connected properly.

   Yes **No**
   ↓ → Connect the cables as required, and then go to “Function Checks” on page 2-4.

3. Make sure the AC power cable operates correctly.

   The cable is plugged into the power outlet correctly.

   Yes **No**
   ↓ → Plug the cable into the outlet correctly, and then go to “Function Checks” on page 2-4.

4. Unplug the bed from its power source and use an appropriate test device to check for the presence of the voltage at the power outlet.

   The voltage is correct.

   Yes **No**
   ↓ → Inform the customer of the problem concerning the power outlet. Connect the bed to a working power outlet, and then go to “Function Checks” on page 2-4.

5. Examine the AC power cable for damage.

   The AC power cable is in satisfactory condition.

Yes **No**
↓ → Replace the AC power cable (refer to procedure 4.2), and then go to "Function Checks" on page 2-4.

6. Using the CPR control, adjust the head section to the high position.

SHOCK HAZARD:
The potential for electrical shock exists with electrical equipment. Failure to follow facility protocols may result in death or serious personal injury.

   a. Remove the power supply cover.
   b. Plug the unit into an appropriate power source.
   c. Using a digital multimeter set to AC volts, On the AC power cable, check for the presence of the AC voltage.

   The voltage is correct.

Yes **No**
↓ → Replace the AC power cable (refer to procedure 4.2), and then go to "Function Checks" on page 2-4.

7. Using a digital multimeter set to AC volts, check for the presence of the AC voltage on the transformer connection on the motor control P.C. board.

   The voltage is correct.

Yes **No**
↓ → Replace the power supply (refer to procedure 4.3), and then go to "Function Checks" on page 2-4.

8. Test the interface P.C. board.
   a. Disconnect the patient pendant and siderails.
   b. Connect a known good part.
   c. Connect the patient pendant and siderails to the good part.

   All functions are operate correctly.

Yes **No**
↓ → Replace the original interface P.C. board. If this solves the problem perform the "Final Actions" on page 2-9, otherwise contact Hill-Rom Technical Support.

9. Test the patient pendant and siderail controls.
   a. Disconnect the patient pendant and siderails.

b. Connect a known good part.

c. Connect the patient pendant and siderails to the good part one at a time, testing the functions after a part is connected.

10. Make sure that the patient pendant and caregiver siderail controls operate correctly.

    The functions are operational.

    Yes **No**

    ↓ → Replace the patient pendant or siderail as required. If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom Technical Support.

11. Go to “Final Actions” on page 2-9.

2.2 Lockout Malfunction

NOTE:
The symptom of this fault is after pressing the lockout button, none of the indicators flash.

NOTE:
The Bed Not Down indicator does not flash in the steps that include the asterisk symbol (*).

1. At least one of the other functions is operates correctly.

   Yes **No**
   ↓ → Go to RAP 2.1..

2. Verify the correct connection in the interface box:

   a. Swap siderail cable connections inside the interface box.

   b. Press the Lockout control.

   All the indicators flash (*).

   Yes **No**
   ↓ → Go to step 4.

3. Replace the siderail control P.C. board (refer to procedure 4.15 on page 4-45) on the affected siderail.

4. Do the following to make sure the caregiver siderail controls operate properly.

   a. Disconnect the control unit.

   b. Connect a known good part.

   c. Press the function on the caregiver control panel.

   All the LEDs flash (*).

   Yes **No**
   ↓ → Replace the siderail control panel (refer to procedure 4.17 on page 4-49) with the proper configuration. If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom Technical Support.

5. Go to “Final Actions” on page 2-9.

2.3 Hilow Malfunction

1. At least one of the other functions is working.

   Yes **No**
   ↓ → Go to RAP 2.1.

2. Identify the relevant hilow column.

   One hilow column does not operate.

   Yes **No**
   ↓ → Go to step 5.

3. Swap the hilow column connectors #6 and #4 (yellow) on the power supply P.C. board (see table 4-1 on page 4-11).

   The faulty column operates properly.

   Yes **No**
   ↓ → Replace the defective column: head hilow (refer to procedure 4.9 on page 4-27) or foot hilow (refer to procedure 4.10 on page 4-30).

4. Replace the power supply (refer to procedure 4.3 on page 4-9).

5. Go to “Final Actions” on page 2-9.

2.4 Knee Section Malfunction

1. At least one of the other functions operates correctly.

   Yes **No**
   ↓ → Go to RAP 2.1.

2. Do the following to make sure the controls operate correctly.

   a. Connect a known good part.

   The controls operate correctly.

   Yes **No**
   ↓ → Go to step 4.

3. Replace the affected control.

4. Do the following to make sure knee section motor operates correctly.

   a. Remove the power supply cover.

   b. Swap the knee section and foot section motor connectors (#5 brown & #2 green) or connect a new knee section motor.

   c. Press the Foot Up/Down control to raise and lower the knee section.

5. The knee section operates correctly.

   Yes **No**
   ↓ → Replace the knee motor (refer to procedure 4.7 on page 4-21). If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom Technical Support.

6. Replace the power supply (refer to procedure 4.3 on page 4-9).

   This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

7. Go to “Final Actions” on page 2-9.

2.5 Head Section Malfunction (excluding Automatic Contour)

1. At least one of the other functions is working.

   Yes **No**
   ↓ → Go to RAP 2.1..

2. Do the following to make sure controls operate correctly.

   a. Connect a known good part.

   The functions are operating correctly.

   Yes **No**
   ↓ → Go to step 4.

3. Replace the affected control.

4. Do the following to make sure head section motor operates correctly.

   a. Press the Head Up control and raise the head section to the high position. If this cannot be accomplished electrically, use the CPR handle and raise the head section manually.

   b. Remove the power supply cover.

   c. Connect a known good motor.

   d. Press the Head Up control to “raise” then press the Head Down control to “lower” the head section.

   The head section operates correctly.

   Yes **No**
   ↓ → Replace the head motor (refer to procedure 4.5 on page 4-15). If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom technical support.

5. Replace the power supply (refer to procedure 4.3 on page 4-9).

   This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

6. Go to “Final Actions” on page 2-9.

2.6 Battery Backup Malfunction

1. Inspect the date on the battery. Replace if older than 3 years old.

2. Do the following to make sure the controls operate correctly.

   a. Connect a known good control (pendant or siderail P.C. board).

   The controls operate correctly.

   Yes **No**
   ↓ → Go to step 4.

3. Replace the affected controls.

4. Remove the cover of the power supply andmake sure the battery is properly connected.

   The battery is connected properly.

   Yes **No**
   ↓ → Connect the battery properly and go to “Function Checks” on page 2-4.

5. Make sure the battery is charging properly.

   Plug the bed into an appropriate power source, and make sure that it remains connected for at least 12 hours without the batteries being used. After 12 hours, unplug the bed from its power source.

   The bed operates correctly on battery backup after charging.

   Yes **No**
   ↓ → Go to step 7.

6. Go to “Final Actions” on page 2-9.

7. Make sure the battery backup is not defective by replacing with a new battery.

   The bed operates correctly with the new battery backup.

   Yes **No**
   ↓ → Contact Hill-Rom Technical Support.

8. Replace the power supply (refer to procedure 4.3 on page 4-9). If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom Technical Support.

2.7 Foot Section Malfunction

1. At least one of the other functions is working.

   Yes **No**
   ↓ → Go to RAP 2.1.

2. Do the following to make sure the controls operate correctly.

   a. Disconnect all the controls.

   b. Connect connect a known good control.

3. The controls operate correctly.

   Yes **No**
   ↓ → Go to step 5.

4. Connect one control at a time until the bad control is located. Replace the affected control.

5. Test the function of the foot section motor intermediate switch.

   The problem only occurs with the Dining Chair™ Position and knee section functions.

   Yes **No**
   ↓ → Go to step 7.

6. Go to step 11.

7. Do the following:

   a. Remove the power supply cover.

   b. Swap the connectors of the knee section and foot section motors (#5 brown, #2 green) on the power board.

   c. Activate the CPR function.

   The foot section function operates correctly, the knee section motor rod extends to mid-travel.

   Yes **No**
   ↓ → Replace the foot motor (refer to procedure 4.8 on page 4-24).

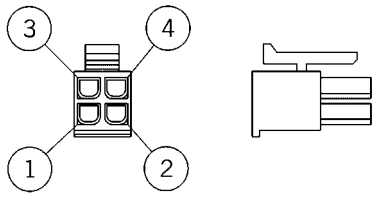
8. Test the function of the thigh section motor intermediate switch:

   a. Connect the foot section motor cable to its socket (#2, green).

   b. Either connect a new thigh section motor in extended position or using an ohmmeter, check the state of the intermediate switch of the thigh section motor. The motor is extended, the contacts 3 and 4 of the 4-pin

connector (socket #5, brown) are short-circuited (see Figure 2-1 on page 2-19). With the rod retracted, the circuit is open.

Figure 2-1. 4-pin Connector



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9. The foot section function operates correctly.

   Yes **No**
   ↓ → Replace the power supply (refer to procedure 4.3 on page 4-9). If this solves the problem perform the "Final Actions" on page 2-9, otherwise contact Hill-Rom Technical Support.

10. Replace the knee motor (refer to procedure 4.7 on page 4-21), then go to "Final Actions" on page 2-9, otherwise contact Hill-Rom Technical Support.

11. Using an ohmmeter, check the state of the foot section motor intermediate switch.

    - When the rod is extended, contacts 3 and 4 (see Figure 2-1 on page 2-19) of the connector (socket #2, green) are short-circuited.
    - When the rod is retracted, the circuit is open.

    The foot section motor intermediate switch is working.

    Yes **No**
    ↓ → Replace the power supply (refer to procedure 4.3 on page 4-9). If this solves the problem perform the "Final Actions" on page 2-9, otherwise contact Hill-Rom Technical Support.

12. Replace the foot motor (refer to procedure 4.8 on page 4-24).

    This solves the problem.

    Yes **No**
    ↓ → Contact Hill-Rom Technical Support.

13. Go to "Final Actions" on page 2-9.

2.8 Trendelenburg/Reverse Trendelenburg Malfunction

Initial conditions: the hilow function works (see "Function Checks" on page 2-4).

1. At least one of the other functions is working.

   Yes **No**
   ↓ → Go to RAP 2.1.

2. Do the following to make sure the caregiver controls operate correctly.

   a. Disconnect the control unit.

   b. Connect a known good control unit.

   The trendelenburg/reverse trendelenburg function works.

   Yes **No**
   ↓ → Replace the power supply (refer to procedure 4.3 on page 4-9). If this solves the problem perform the "Final Actions" on page 2-9, otherwise contact Hill-Rom Technical Support.

3. Replace the affected control unit.

   This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom Technical Support.

4. Go to "Final Actions" on page 2-9.

2.9 Bed Connected to AC Power, Brakes Not Applied Detection Malfunction

Initial conditions: the hilow function works (see "Function Checks" on page 2-4).

1. At least one of the other functions is working.

   Yes **No**
   ↓ → Go to RAP 2.1.

2. Do the following to make sure the brake detection switch is connected correctly.

   a. Remove the foot end frame cover.

   b. Make sure the brake detection switch connector is correctly connected to the foot column connector under the cable cover.

   The Bed Connected to AC Power But Brake Not Applied Detector operates correctly.

   Yes **No**
   ↓ → Go to step 4.

3. Do the "Function Checks" on page 2-4.

4. Do the following to make sure the brake detection switch operates correctly.

   a. Disconnect the 2-pin connector at the bottom of the foot column.

   b. Using a digital multimeter, set to ohms, at the terminals of the brake detection switch, check that the brake detection switch operates correctly.

      - Idle (not braked), circuit closed
      - Active (braked), circuit open

   The switch operates correctly.

   Yes **No**
   ↓ → Replace the brake detection switch and brake detection cabling subassembly (refer to procedure 4.11 on page 4-34), then go to to "Final Actions" on page 2-9).

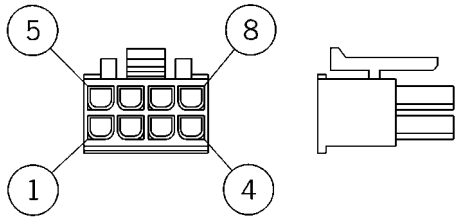
5. Do the following to make sure the foot column cables are connected correctly.

   a. Reconnect the 2-pin connector to the bottom of the foot column.

b. Disconnect the foot column extension cable in the central rail of the bed frame.

c. The same verification applies to the terminals of the 8-pin connector in the central rail of the bed frame by checking the operation of the brake detection switch from terminals 1 and 6 of the foot column (see figure 2-2 on page 2-22).

Figure 2-2. 8-pin connector



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The foot column cable connections and brake detection switch continuity are correct.

Yes **No**

↓ → Replace the foot column (refer to procedure 4.10 on page 4-30), then go to "Final Actions" on page 2-9.

6. Do the following to make sure the foot column extension operates correctly.

   a. Remove the power supply cover.

   b. Disconnect connector #3 (8-pin blue) on the power board.

   c. The same verification applies to the terminals of connector #3 (8-pin blue) at the level of the power supply by checking the operation of the brake detection switch from terminals 1 and 6 (see figure 2-2 on page 2-22) of the foot column extension cable.

   The extension, column cable connections, and switch continuity are correct.

   Yes **No**

   ↓ → Replace the foot hilow column and extension cable subassembly (refer to procedure 4.10 on page 4-30). If this solves the problem perform the "Final Actions" on page 2-9, otherwise contact Hill-Rom technical support.

7. Replace the power supply (refer to procedure 4.3 on page 4-9).

   This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

8. Go to “Final Actions” on page 2-9.

2.10 CPR Malfunction

Initial conditions: the hilow function works (see “Function Checks” on page 2-4).

1. Check the mechanics of the CPR system:

   Remove the seat , knee and foot sleep deck sections. Make sure the mounting hardware is not damaged or missing from the release mechanism of the head section motor.

   All hardware is secure and not damaged.

   Yes **No**
   ↓ → Replace the missing or damaged parts, and then go to “Function Checks” on page 2-4.

2. Check that the release cable is not broken or damaged.

   The cable is intact.

   Yes **No**
   ↓ → Go to step 4.

3. Check that the adjustment of the release cable is correct (refer to procedure 4.6 on page 4-18).

   The adjustment is correct.

   Yes **No**
   ↓ → Adjust the release cable (refer to procedure 4.6 on page 4-18).

4. Replace the head section motor (refer to procedure 4.5 on page 4-15) and release cable subassembly (refer to procedure 4.6 on page 4-18).

   This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

5. Go to “Final Actions” on page 2-9.

2.11 Braking Malfunction

1. Check that the screws or supports are not damaged, loose, or missing from the caster attachments.

   All the supports and screws are secure and not damaged.

   Yes **No**
   ↓ → Replace the missing parts, and then go to "Function Checks" on page 2-4.

2. Check the brake/steer bar. Set it to the brake position, and then check that the four casters are locked by trying to move the bed.

   The braking is correct.

   Yes **No**
   ↓ → Replace the caster(s) (refer to procedure 4.13 on page 4-40), then go to "Final Actions" on page 2-9.

3. This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

4. Go to "Final Actions" on page 2-9.

2.12 Steering Malfunction

1. Set the brake/steer bar to the brake position. Check that the screws or supports are not damaged, loose or missing from the caster attachments.

   All the supports and screws are secure and not damaged.

   Yes **No**
   ↓ → Replace the missing parts, and then go to “Function Checks” on page 2-4.

2. Check the steering function. Set the brake/steer bar to the steer position, push the bed lengthways, and check that the foot left caster locks in the lengthways direction of the bed.

   The caster locks in the lengthways direction.

   Yes **No**
   ↓ → Replace the caster (refer to procedure 4.13 on page 4-40). If this solves the problem perform the “Final Actions” on page 2-9, otherwise contact Hill-Rom technical support.

3. This solves the problem.

   Yes **No**
   ↓ → Contact Hill-Rom technical support.

4. Go to “Final Actions” on page 2-9.

Chapter 3
Theory of Operation

Introduction

There are two Theories of Operation for the CareAssist™ Bed:

- Mechanical
- Electrical

The interaction between these subsystems lets all the operational functions be used.

The electrical functions are driven by low voltage actuators.

Each of the subsystems is described separately in the following sections. The schematic diagrams are located at the end of this chapter.

Mechanical System

The mechanical subsystem consists of two connected systems:

- Bed frame
- Sleep surface

Retractable Head Section

The retractable head section feature is achieved by controlling a sliding movement of the head section frame with two sliding blocks in channels at each side of the intermediate frame. This lets the head section frame extend (with respect to the seat section). The hard surface also extends (with respect to the head section frame) towards the head end. This is achieved by the two elevation arms of the head section frame that terminate in gear teeth interfaced with the notches in the rear of the head section hard surface and move the hard surface towards the head end as the head section is raised.

Emergency CPR Release

The CPR control handles are located at the head end of the bed, under each corner of the sleep deck. Pulling one of the handles disengages the driving gear of the head section motor inside the actuator. This lets the head section drop under the pull of gravity, assisted/cushioned by two gas springs.

Extendable Foot Section

The extendable foot section lets the caregiver add an additional 4" (102 mm) to the length of the bed. The movement is controlled by a lever under the foot end of the bed. Pulling up on the lever and pulling the foot section out, extends the section. The foot section locks into place when extended or retracted.

Hilow System

WARNING:
The column must be replaced if it becomes defective. The column must never be dismantled. Failure to observe this warning could result in personal injury.

The hilow system features two columns each composed of three sections that slide in relation with each other by a pantograph system. This system is driven by a fixed motor installed at the base of the mechanism. This system lets the

unit travel up or down 15.7" (400 mm). Upper and lower end of travel (EOT) switches that are backed up to make sure of electrical security. The system does not require any special maintenance during its designed period of use. However, the columns can be replaced in the event of a failure, but should never be dismantled or repaired except by Hill-Rom personnel.

Casters

The bed has four casters: three brake and one brake/steer. Each caster has a 30° inclination activation mechanism and three positions:

- Brake caster—Brake/Neutral/Neutral
- Steer caster—Brake/Neutral/Steer

The brake/steer caster is located on the left side, foot end. Antistatic brake casters are standard for the remaining caster positions. They are identified by a yellow dot on the tire.

Braking

The braking system comprises four brake casters that are controlled by the brake/steer bar. The bar consists of two hexagonal bars with a connecting bar situated in the right-hand box-section of the lower frame. The brake/steer bar is directly mounted on the foot end hexagonal bar of the bed.

Steering

The left foot end caster on the left is the steering caster. It is controlled by the brake/steer bar.

Head and Footboards

The headboard and footboard feature an extruded/blow-moulded plastic structure with chrome-plated steel clasps for assembly and decorative laminated panels. The headboard and footboard are interchangeable and can be used as a CPR backboard.

Electrical System

The specifications of the bed are as follows:

Table 3-1. Specifications

Description	Specification
Type	CareAssist™ Bed
Type of protection against electric shock (according to IEC 60601-1)	Class I
Degree of protection against electric shock (according to IEC 60601-1)	Type B
Protection against harmful ingress of water (according to IEC 60529)	IPX4
Intermittent operation	10% 3 min/30 min
Voltage	120 V (+10%, -15%) AC voltage and earth
Frequency	60 Hz
Maximum power load	4.2 A

Refer to the schematic diagram at the end of this section to obtain specific information for the cabling.

The bed is operated by a power supply unit. This unit controls the electrical functions of the bed: hilow, head section and knee section with automatic contour, and foot section.

These functions are performed by motors using very low voltages.

Power Supply Unit Characteristics

Table 3-2. Power Supply Unit Characteristics

Description	Specification
Input characteristics	(see table 3-1 on page 3-4)
Fuse rating on primary	2.2 Slo-Blo®[a]
Maximum power load	360 VA
Output voltage	18 to 40 V AC rectified, filtered
Output power	360 VA
Continuos operation	at 10 VA

a. Slo-Blo® is a registered trademark of LittleFuse, Inc.

The power supply unit is composed of the following components:

- Power stage
- Functions controlled by relays and transistors
- Battery charging circuit
- Control logic and specific functions

The functions are activated after electronically unlocking each of them by using one of the following:

- Patient pendant
- Caregiver controls

Power Stage

The power stage is composed of a 120 V AC input transformer, protected at the input by 2 antisurge fuses of 2.2 A and an internal thermal cutout that **cannot be reset**. There is one non-fused secondary for the main control board and 1 fused secondary for the rest of the circuitry both followed at the outputs by bridge rectifiers and filter capacitors. The value of this antisurge fuse is 1 A.

The non-fused secondary; through the bridge rectifier and filter capacitor, produces an output voltage VDC1 which is approximately 24 V DC and unregulated. The fused secondary produces a soft regulated 12 V DC for use in the SideCom® Communication System P.C. board and bed exit system. The available power enables several functions to be controlled simultaneously.

Function Control

The motors are controlled by relays. In order to protect these relays from electrical sparks during switching, the second FET transistor checks the delay power when a function is activated, thus allowing the switches to close with no voltage. In the same way, when a function control is released, the FET transistor cuts the power before the contact opens.

Overload limiting is provided by permanently controlling the current at the output of each motor. In the event of overload or mechanical blockage, the supply of the relevant motor is cut off by a control transistor without affecting the operation of the other motors, except for specific situations. In this case, the overload is indicated by an audible alarm. This overload indication also enables failure of a motor end of travel to be detected, except for the hilow columns, which have a backup end of travel.

Battery Circuit

The bed is equipped with battery backup. This battery backup is internal to the power supply unit. The charging circuit, situated in the power supply unit, has current limiting according to the level of the battery charge. Charging begins as soon as the unit is switched on. At the end of charging, the load current is very low.

When the power supply is disconnected from the AC power, the battery backup is activated by pressing the Battery control on the caregiver controls.

The battery charge level is controlled. In this way, a flashing indicator and an audible low battery alarm by buzzer are activated during movement if the battery voltage drops (this is a continuous beep of several seconds that is heard each time a control is pressed).

After connecting to the power outlet, the indicator continues to flash until the battery has charged.

Battery operation is automatically stopped 30 seconds after the end of the last movement.

Battery Characteristics

Table 3-3. Battery Backup Characteristics

Description	Specification
Components	2 12 V batteries
Capacity of each battery	1.2 Ah
Voltage	24 V DC
Maximum charging time	12 hours
Discharging time (storage), battery connected to bed	Minimum 10 days
Discharging time (storage), battery not connected to bed	3 months

The batteries are a sealed lead acid and are connected in series on the main board and protected by a 10 Amp fuse on the connection wires.

The battery type has no memory effect and can be charged regularly without any particular constraints.

The capacity of the battery backup after full charging is at least three raise and lower cycles for hilow, head section, knee section and foot section with the maximum safe working load 400 lb (185 kg) on the bed.

Control Logic and Specific Functions

Combined activations of the motor provide the following functions:

- Dining Chair™ Position
- Automatic contour
- Trendelenburg and Reverse Trendelenburg function

Lockout management

Patient pendant or caregiver siderail control unit interfacing

Indication of Bed Not in Low Position (see “Detection of Bed Not in Low Position” on page 3-9)

Indication of Bed Connected to AC Power but Brakes not Applied (see “Detection of Bed Connected to AC Power but Brakes not Applied” on page 3-16)

All of these functions are integrated into a complex programmable logic device (CPLD).

Patient Pendant

The patient pendant controls operate at 3.3 V DC supplied by the main bed control and integrate three main principles:

- Filtering and amplification of inputs for electrostatic protection and signal formatting
- Multiplexing for the management of the controls
- Demultiplexing for the control of the indicators

Data from the controls and indicators are transmitted in series (link type - SPI) so as to reduce the number of wires. The clock signal that starts these exchanges is controlled by the main bed control P.C board. All the data is sent in tens of milliseconds. When the system is in stand-by mode, the power is cut off and the clock signal is no longer controlled. The battery control is therefore directly wired so as to have continuous operation.

Motor Characteristics

For motor characteristics, see table 3-4 on page 3-8.

Table 3-4. Motor Characteristics and Dimensions

Description	Hilow column motor	Head motor	Knee motor	Foot motor
Power	96 W (x2)	120 W	84 W	84 W
Voltage	18 to 40 V DC	18 to 40 V DC	18 to 40 V DC	18 to 40 V DC
Intermittent service	10% 3 min/30 min	10% 2 min/18 min	10% 6 min/60 min	10% 6 min/60 min
Actuator/ column travel	400 mm ± 5 mm (15.75")	239 mm ± 2 mm (9.4")	60 mm ± 2 mm (2.36")	45 mm ± 2 mm (1.77")
Retracted rod/ center distance		445 mm ± 2mm (17.5")	310 mm ± 2mm (12.2")	325 mm ± 2mm (12.8")

Management of the Motors

The motors control signals are supplied by the main bed control P.C. board. Their extreme positions are detected in series by upper and lower internal EOT devices. These devices directly cut off the power supply for the head section, knee section and foot section actuators. In addition, the head section and foot section motors have intermediate internal microswitches to control the automatic contour and Dining Chair™ position.

The two hilow columns also have upper and lower internal EOT devices. For safety reasons, they are both backed up at each end. If one of these safety devices is activated, the column cannot be used; however the other functions remain operational.

Complementing these EOT devices, the overload limiting function of the power supply unit provides protection in the event of mechanical failures, obstacles, or overload.

Detection of Bed Not in Low Position

This type of detection is obtained by taking into account the state of the low EOT of the hilow columns. The power supply unit controls the corresponding indicator of the control unit as soon as one of the two EOTs is released.

Automatic Contour

The power supply, when it received a command from the control unit, controls the automatic contour (head section and thigh section) operation of the bed. This function is carried out through an intermediate switch of the thigh section actuator. When the Head Up function is activated from the horizontal position, the head section and knee section rise until the intermediate internal microswitch of the knee section actuator cuts its power at approximately 20°. The head section actuator continues to operate until its upper EOT is reached or the control is released. When the Head Down function is activated and the head section reaches the low position, the knee section actuator continues operating until its lower EOT is reached or the control is released.

Dining Chair™ Position

The Dining Chair™ Position function combines the movements of the bed frame sections and uses the intermediate internal microswitches of the knee section and foot section motors to control the interaction between these two sections.

Detection of Bed Connected to AC Power but Brakes Not Set

The detection system operates by a normal on switch, mounted on the foot end crossbar and is activated by the brake/steer bar. The power supply unit controls an audible alarm if the following two elements occur together: AC power is present and the switch not activated. The audible alarm stops when the brake is applied or when the bed is unplugged from the power source.

Trendelenburg/Reverse Trendelenburg

The Trendelenburg/Reverse Trendelenburg is a fully electric function accessed by the caregiver. The function is enabled by the Enable control on the caregiver siderail controls. The principle involves controlling the two hilow columns in opposing directions according to the position required, regardless of the initial height and position of the sleep surface. As long as one of the two controls remains pressed, the two columns continue to move until their internal EOT is reached. The maximum inclination can be reached as long as AC power or battery backup is available.

Electrical System Wiring Diagram

Figure 3-1. SideCom® Communication System

Refer to fold-out FO 3-1 at the rear of this manual.

Figure 3-2. Caregiver Control

Refer to fold-out FO 3-2 at the rear of this manual.

Figure 3-3. Siderail Interface P.C. Board—P/N 72207 and 71514

Refer to fold-out FO 3-3 at the rear of this manual.

Figure 3-4. Caregiver Signal Conditioning

Refer to fold-out FO 3-4 at the rear of this manual.

Figure 3-5. Bed Control Board Power and Phase Control

Refer to fold-out FO 3-5 at the rear of this manual.

Figure 3-6. Bed Control Board Power Management

Refer to fold-out FO 3-6 at the rear of this manual.

Figure 3-7. Bed Control Board Battery Management

Refer to fold-out FO 3-7 at the rear of this manual.

Figure 3-8. Bed Control Board Clock and Divider

Refer to fold-out FO 3-8 at the rear of this manual.

Figure 3-9. Bed Control Board Relay, FET and Drivers

Refer to fold-out FO 3-9 at the rear of this manual.

Figure 3-10. Bed Control Board PLD and Connector

Refer to fold-out FO 3-10 at the rear of this manual.

Figure 3-11. Bed Control Board Motor Current Limiter

Refer to fold-out FO 3-11 at the rear of this manual.

NOTES:

Chapter 4
Removal, Replacement, and Adjustment Procedures

Tool and Supply Requirements

To service the CareAssist™ Bed, the following tools and supplies are required:

- Ratchet
- Extension, 6"
- 10 mm wrench (2 required)
- 13 mm wrench
- 13 mm socket
- T25 Torx®[1] screwdriver
- T15 Torx® screwdriver
- T25 Tamper resistant Torx® screwdriver
- 10 mm hex key
- Small screwdriver
- #2 phillips head screwdriver
- Soft faced hammer
- 8 mm pin punch
- Loctite®[2] 242 adhesive
- E-ring installation tool
- (2) Jack stand
- Scissor jack
- 3/32" punch
- Marking pen

1. Torx® is a registered trademark of Textron, Inc.
2. Loctite® is a registered trademark of Loctite Corporation, Inc.

- Tape
- (2) 4" x 4" x 2' piece of wood
- Rags
- Isopropyl alcohol
- Wire cutters
- Vice grips®[1]

1. Vice grip® is a registered trademark of American Tool Companies, Inc.

4.1 Sleep Deck

Tools required: #2 phillips head screwdriver
E-ring installation tool
10 mm wrench
Marking pen
Tape

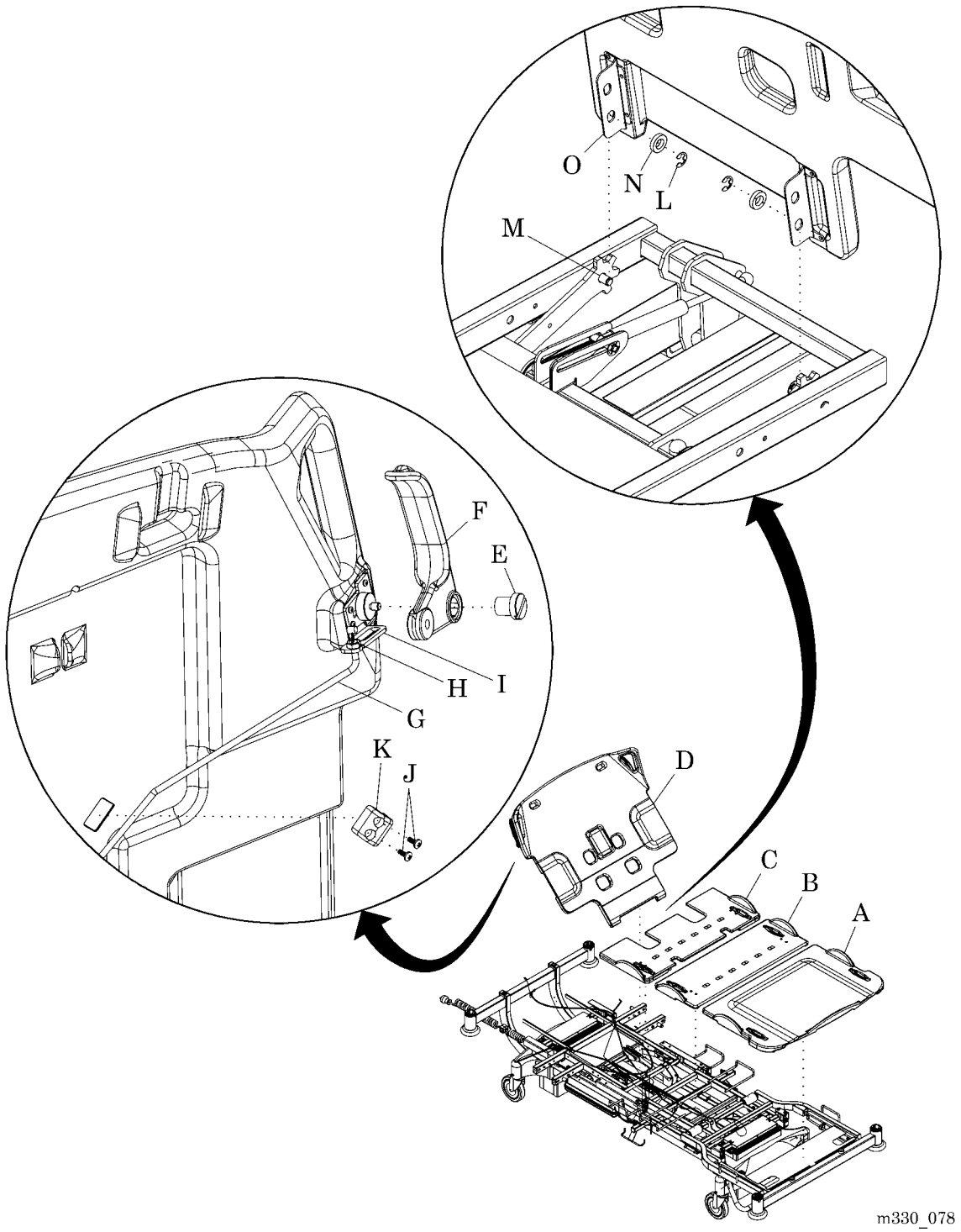
Removal

1. Set the brakes.
2. Raise the head section to the high position.
3. Lower the knee and foot sections to the flat position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the unit from its power source. Let the unit sit for 60 seconds for the battery to time out.
5. For the foot section, grip the section (A) on either end and remove it from the bed (see figure 4-1 on page 4-4).
6. For the thigh section, grip the section (B) on either end and remove it from the bed.
7. For the seat section, perform the following:
   a. Make sure the head section (D) is in the full up position.
   b. Grip the seat section (C) on either end and remove it from the bed.
8. For beds equipped with bed exit, remove the tape switches (refer to procedure 4.20).
9. For the head section (D), perform the following:
   a. Using the CPR release, raise the head section (D) to the full up position.
   b. Remove the seat section (C).
   c. Mark the CPR cables (G) as left or right for installation later.

Figure 4-1. Sleep Deck



d. Remove the screw (E) securing the CPR handle (F) to the CPR mount bracket (I).

e. Remove the CPR handle (F) from the CPR cable (G).

f. Loosen, do not remove, the jam nut (H) securing the CPR cable (G) to the CPR mount bracket (I).

g. Remove the two screws (J) securing the cable guide (K) to the head section (D).

h. Remove the cable guide (K) from the CPR cable (G).

i. Repeat step d through step h for the other side.

j. Remove the E-ring (L) from one side of the lower hinge point (M).

k. Remove the plastic washer (N) from the lower hinge point (M).

l. Repeat step j and step k for the other side.

m. Move the head section to one side to disengage the hinge bracket (O) from the hinge point (M).

n. Move the head section to the other side to disengage the hinge bracket (O) from the hinge point (M).

o. Slide the head section (D) toward the head end of the bed to disengage it from the head section frame.

p. Remove the head section (D) from the bed.

Replacement

1. Do the removal procedure in reverse order.

NOTE:
The seat section can only be installed when the head section is in the full up position.

2. Make sure the CPR cable is adjusted correctly (refer to procedure 4.6)

3. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.2 AC Power Cord

Tools required: 13 mm ratchet wrench
T25 Torx®[1] tamper resistant screwdriver

Removal

1. Set the brakes.
2. Raise the head section to its highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit sit for 60 seconds so the battery will time out.
4. Remove the headboard.
5. Remove the two screws (A) and washers (B) from the power supply cover (C) (see figure 4-2 on page 4-7).
6. Remove the cover (C).
7. Disconnect the power cord connector (D) from the fuse board (E).
8. Remove the screw (F) securing the power cord ground wire (G) to the bed frame (H).
9. Remove the two screws (I) securing the power cord strain relief (J) to the bed frame (H).
10. Remove the power cord (K).

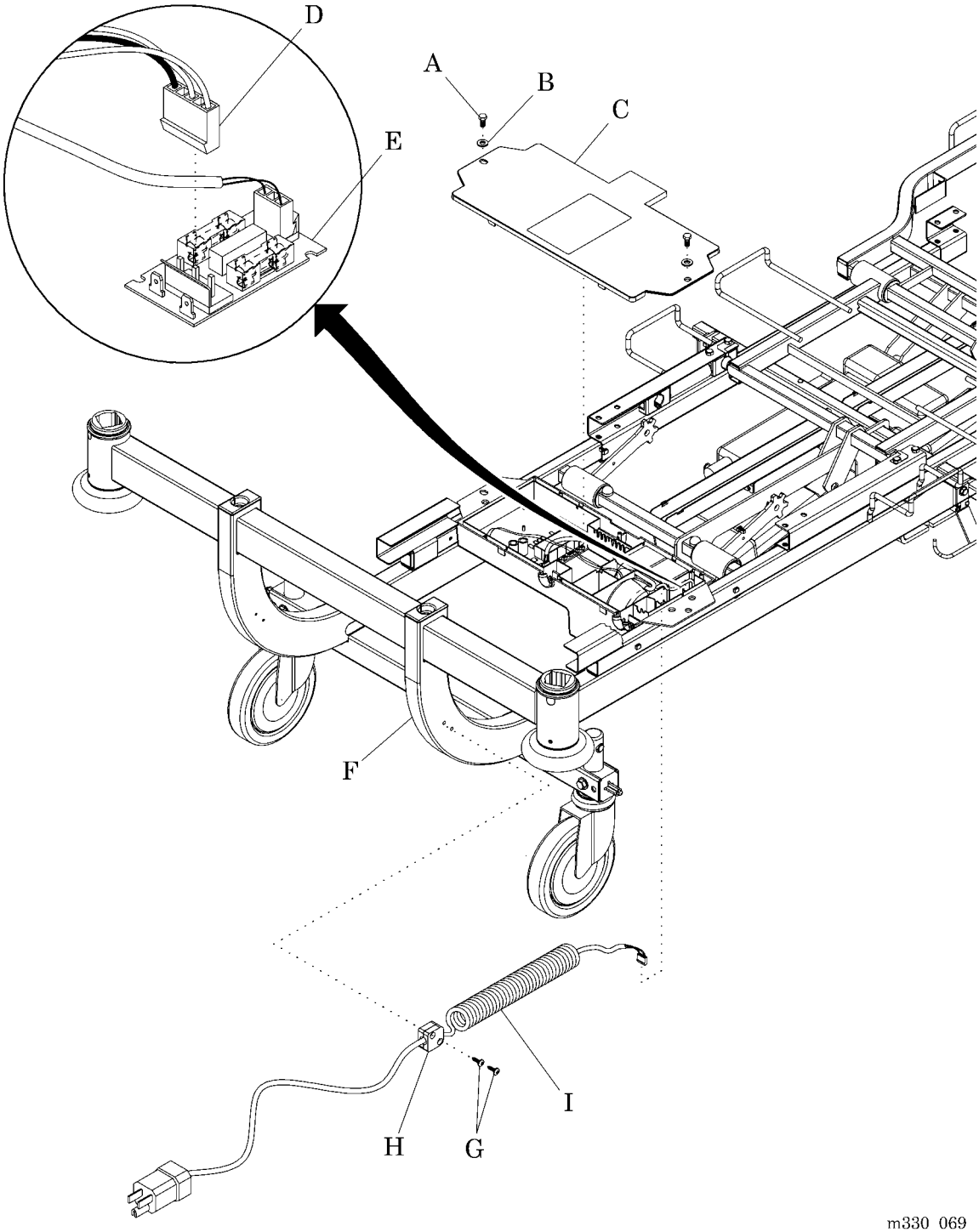
Replacement

1. Perform the removal procedure in reverse order.
2. Plug the unit into an appropriate power source.
3. Raise and lower the bed fully to make sure the power cord expands and contracts without any problems.

1. Torx® is a registered trademark of Textron, Inc.

4. Check that the earth continuity of the accessible metal parts is correct (see “Earth resistance” on page 6-7 in the Preventive Maintenance Schedule).

Figure 4-2. Power Cord



SHOCK HAZARD:
An abnormally high leakage current is symptomatic of a degradation within the AC power cable and the power supply. Personal injury could result if the value of the leakage current is above 500 microamperes.

5. Check that the leakage current of the bed is compliant (see "Leakage current" on page 6-5 in the Preventive Maintenance Schedule).

6. To make sure the CareAssist™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.3 Power Supply

Tools required: 13 mm socket
Ratchet
Extension, 6"

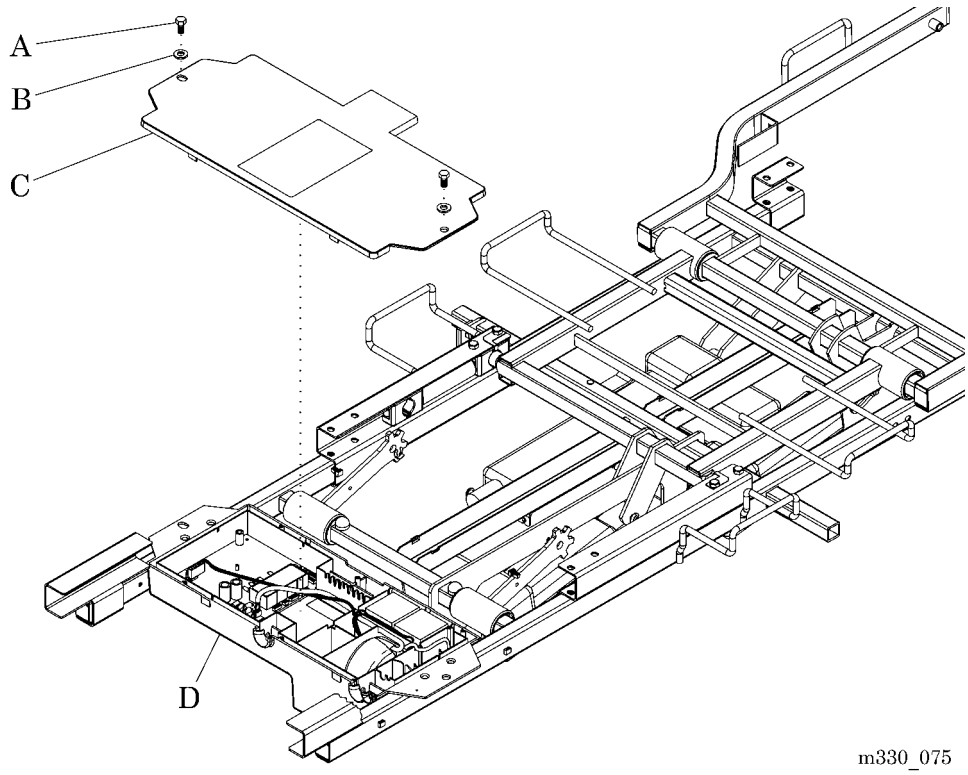
Removal

1. Set the brakes.
2. Raise the head section to the high position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

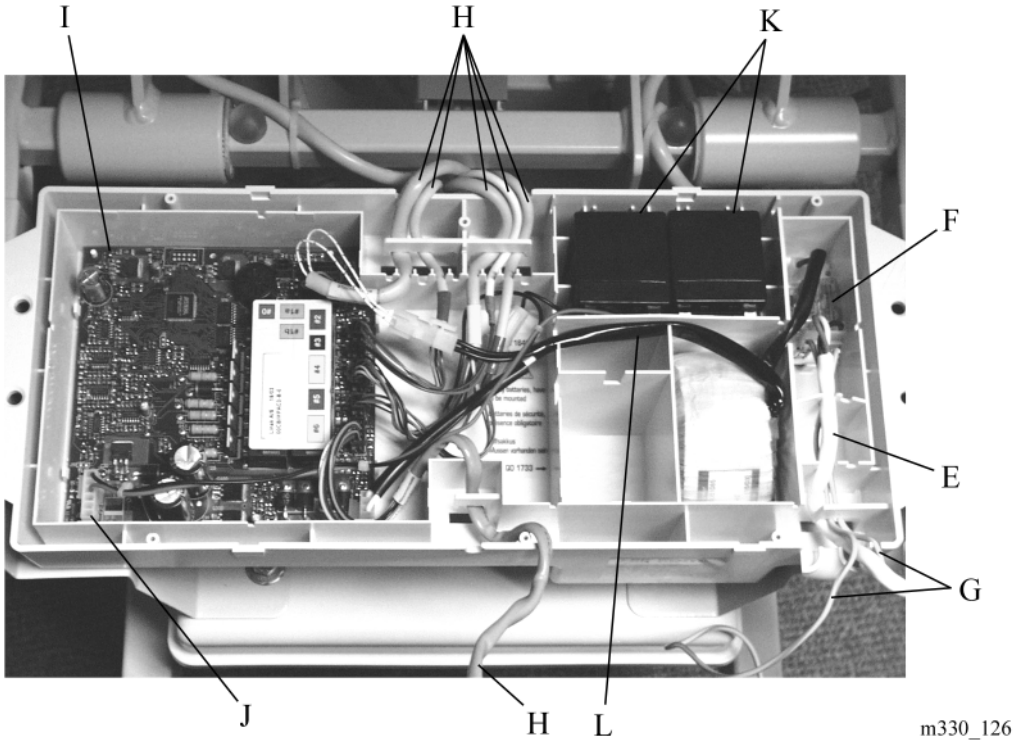
3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Remove the two screws (A) and washers (B) securing the cover (C) to the power supply (D) (see figure 4-3 on page 4-9).

Figure 4-3. Power Supply



5. Remove the cover (C).
6. Note the routing and connection of the cables in the power supply.
7. Disconnect the AC power cable (E) from the fuse board (F) (see figure 4-4 on page 4-10).

Figure 4-4. Cable Routing



8. Disconnect the cables (H) from the power supply P.C. board (I).
9. Disconnect the two ground wires (G) from the fuse board (F).
10. Disconnect the battery cable (J) from power supply P.C. board (I).
11. Disconnect the transformer power supply cable (L) from the interface P.C. board cable.
12. Remove the batteries (K).
13. Remove the power supply (D) from the bed (see figure 4-3 on page 4-9).

Replacement

1. Do the removal procedures in reverse order. For cable connections, refer to table 4-1 on page 4-11.

Table 4-1. Power Supply Connections

Connector number	Marking	Color	Identification
0	#0	Red	Not used
1a	#1a	Gray	Right hand siderail
1b	#1b	Gray	Left hand siderail
2	#2	Green	Foot section motor
3	#3	Blue	Head section motor
4	#4	Yellow	Foot hilow column
5	#5	Brown	Knee section motor
6	#6	Yellow	Head hilow column

2. Check the dates shown on the batteries and replace them if they are older than three years.

3. Check that the earth continuity of the accessible metal parts is correct (see “Earth resistance” on page 6-7 in the Preventive Maintenance Schedule).

SHOCK HAZARD:
An abnormally high leakage current is symptomatic of a degradation within the AC power cable and the power supply. Personal injury could result if the value of the leakage current is above 500 microamperes.

4. Check that the leakage current of the bed is compliant (see “Leakage current” on page 6-5 in the Preventive Maintenance Schedule).

5. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.4 Battery

Tools required: 13 mm socket
Ratchet
Extension

NOTE:
It is required to change both batteries at the same time.

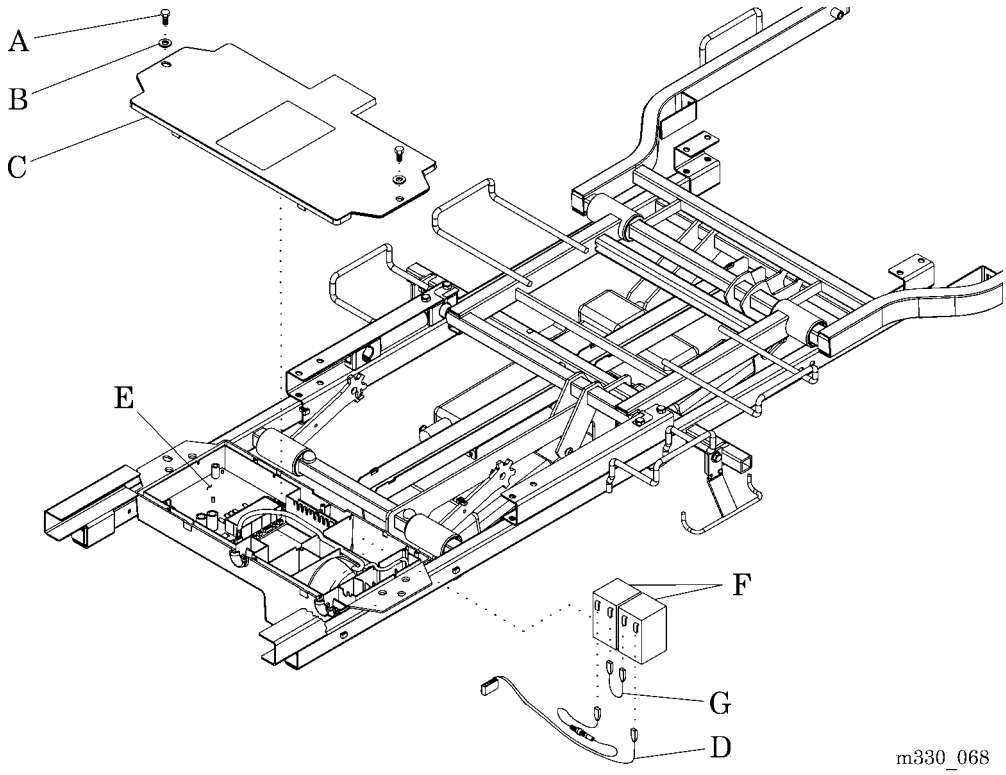
Removal

1. Set the brakes.
2. Raise the head section to the high position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Remove the two screws (A) and washers (B) from the power supply cover (C) (see figure 4-5 on page 4-13).
5. Remove the cover (C).
6. Disconnect the battery cable (D) from the power supply P.C. board (E).
7. Remove the batteries (F).
8. Note the connection of the wires on the batteries.
9. Disconnect the battery cables (D) and (G) from the batteries (F).

Figure 4-5. Battery



Replacement

CAUTION:
The polarities must be respected when installing the elements of the battery backup. Disregarding this caution will permanently damage the power supply P.C. board of the bed.

1. Perform the removal in reverse order, ensure the correct polarities are used when connecting new batteries.

NOTE:
When connecting the batteries, the red wire must be connected last. A spark is produced when it is connected, but is not dangerous for the power supply P.C. board or the technical personnel.

2. Raise and lower the bed one time to make sure the battery is functioning correctly.

NOTE:
A technician may lay on the bed during these tests.

3. Plug the unit into an appropriate power source.

NOTE:
The batteries should be fully recharged at the end of the test or if the low battery signal is heard during the tests.

4. To make sure the CareAssist™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.5 Head Section Motor

Tools required: (2) 10 mm wrench
13 mm socket
Ratchet

Removal

1. Set the brakes.
2. Raise the sleep surface to the highest position.
3. Raise the head section to the highest position.

NOTE:
If the head section motor is defective, the CPR control can be used to raise the head section.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the unit from its power source. Let the unit sit for 60 seconds so the battery will time out.
5. Remove the headboard.
6. Remove the seat and knee sections.
7. Remove the two screws (A) and washers (B) securing the power supply cover (C) to the power supply (D) (see figure 4-6 on page 4-16).
8. Remove the cover (C).
9. On the power supply P.C. board, disconnect the head section motor connector (number 3).
10. Remove the cable cover on the central rail and remove the head section motor cable.
11. Using the CPR control, lower the head section to the flat position.
12. Disconnect the CPR cable (F) from the head motor actuator arm (G) (see figure 4-7 on page 4-16).
13. Count the number of threads (E) on the CPR cable (F) that extend past the cable mount (H) on the head motor (I).

Figure 4-6. Power Supply

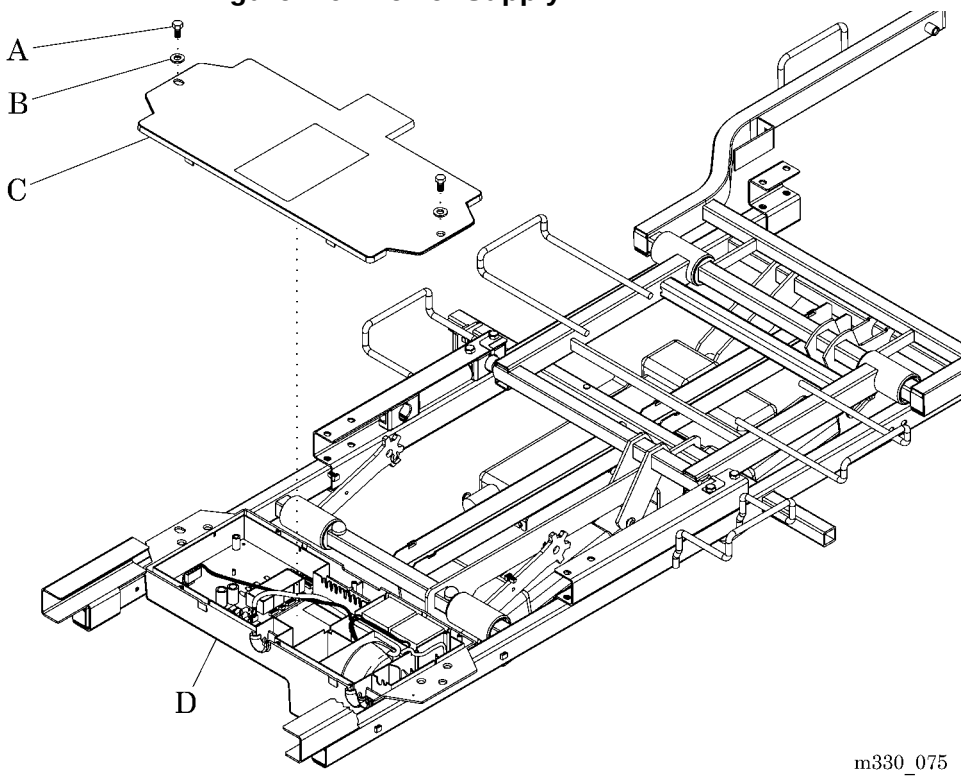
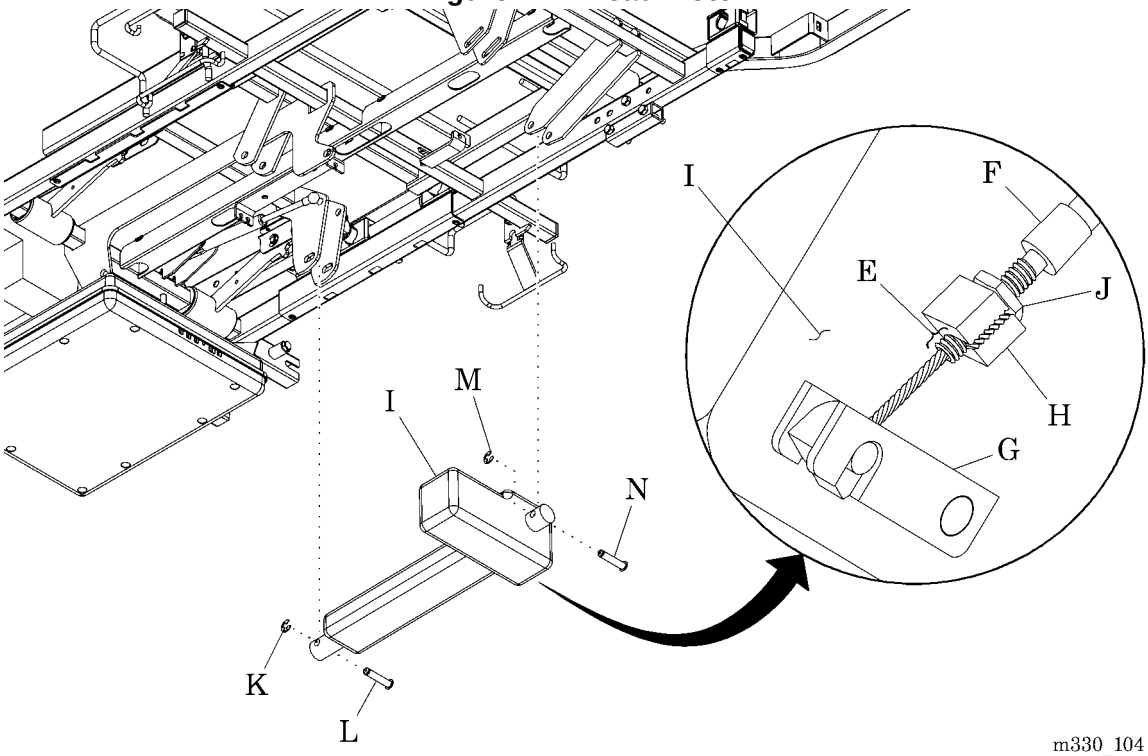


Figure 4-7. Head Motor



14. Loosen the jam nut (J) on the CPR cable (F).

15. Remove the CPR cable (F) from the cable mount (H).

NOTE:
The CPR cable is threaded into the cable mount.

16. Remove the E-ring (K) from the pin (L) at the rod end of the motor (I).

17. Remove the E-ring (M) from the pin (N) at the body end of the motor (I).

18. While supporting the motor (I), remove the pin (L) .

19. While supporting the motor (I), remove the pin (N).

20. Remove the motor (I) from the bed.

Replacement

CAUTION:
Ensure that the elastic found on the new motors is not wound around the motor body before removing it (cut). If necessary, turn the motor end rod in the appropriate direction to unwind this elastic. It is used to indicate the correct position of the switches and internal end of travels of the motor. The incorrect position of these elements may damage the motor or the structure of the bed.

1. Perform the removal procedure in reverse order.
2. Remove the elastic on the motor.
3. Activate the CPR function. The CPR function should activate when the CPR handle is approximately half way through its travel.
4. Adjust the CPR cable as needed (refer to procedure 4.6).
5. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.6 CPR Cable

Tools required: (2) 10 mm wrench
Small screwdriver

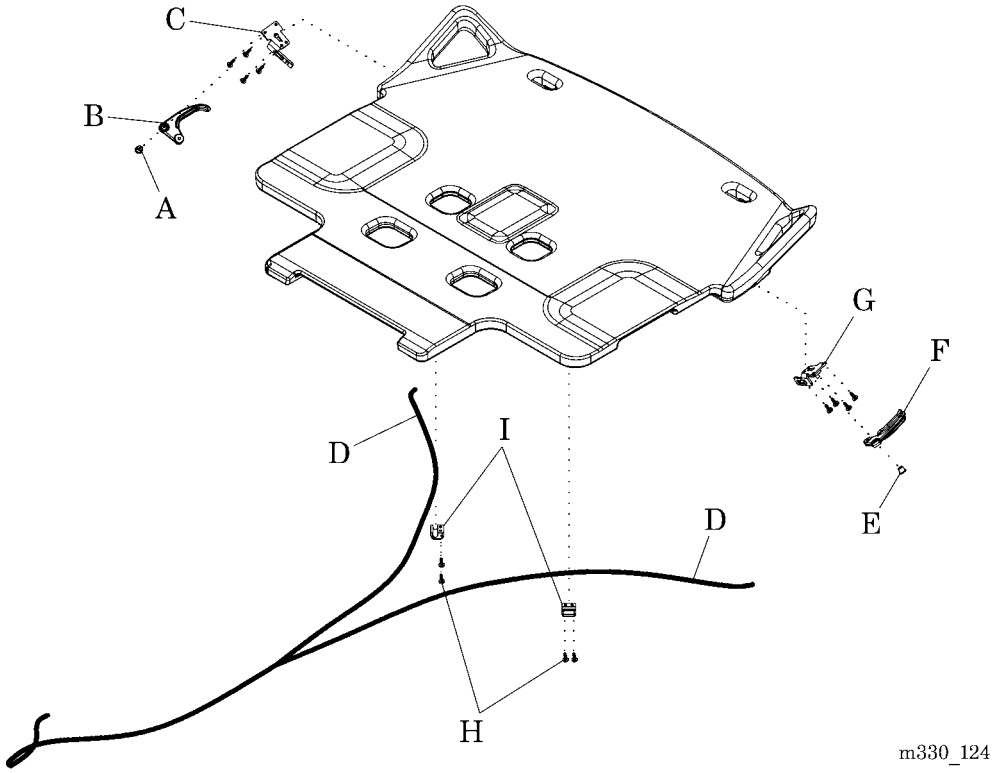
Removal

1. Set the brakes.
2. Raise the head section to the highest position.
3. Raise the sleep surface to the highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

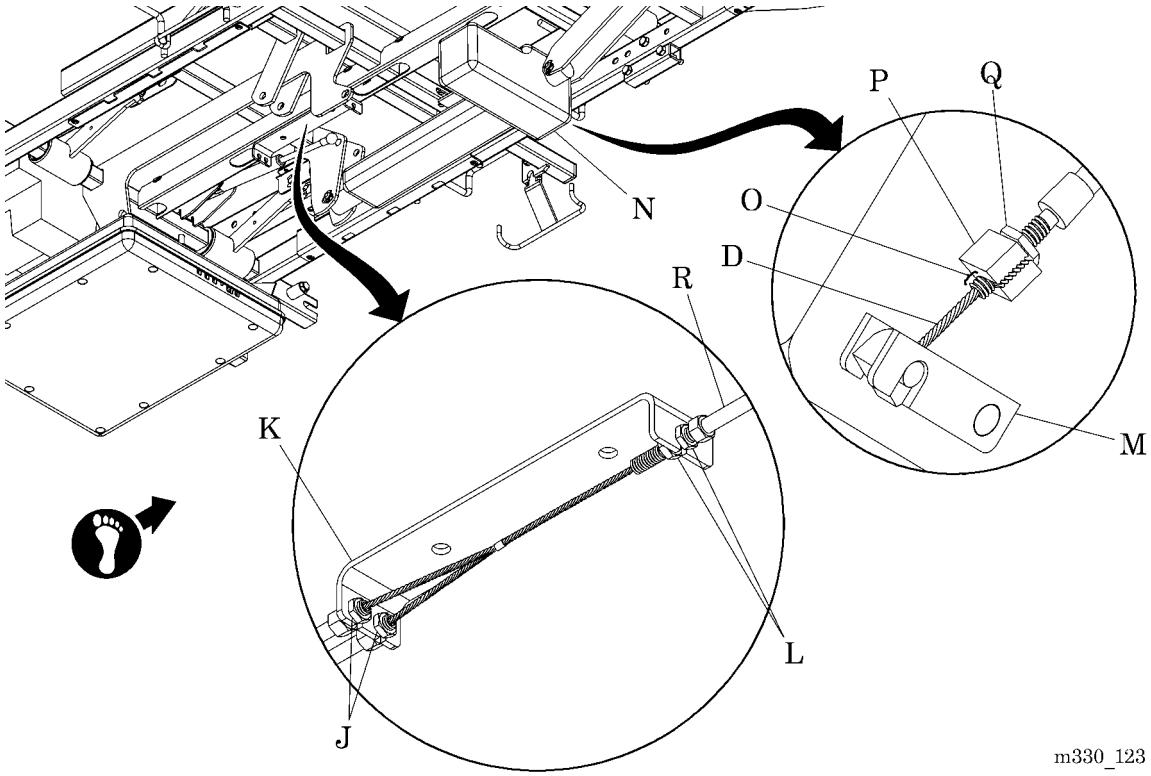
4. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
5. Remove the screw (A) securing the right CPR handle (B) to the CPR mounting bracket (C) (see figure 4-8 on page 4-18).

Figure 4-8. CPR Cable



6. Remove the right CPR handle (B) from the CPR cable (D).
7. Loosen the jam nut (not shown) on the CPR cable (D) at the CPR cable mount bracket (C).
8. Remove the screw (E) securing the left CPR handle (F) to the CPR mounting bracket (G).
9. Remove the left CPR handle (F) from the CPR cable (D).
10. Loosen the jam nut (not shown) on the CPR cable (D) at the CPR cable mount bracket (G).
11. Remove the four screws (H) securing the two cable guides (I) to the head section.
12. Remove the two cable guides (I).
13. Loosen the two jam nuts (J) securing the head section CPR cables to the adjuster bracket (K) (see figure 4-9 on page 4-19).

Figure 4-9. CPR Cable Adjustment



14. Loosen the jam nuts (L) securing the CPR cable (D) to the adjuster bracket (K).

15. Disconnect the CPR cable (D) from the release mechanism (M).

16. Count the number of threads (O) on the CPR cable (D) at the CPR cable mount (P).

17. Loosen the jam nut (Q) on the CPR cable (D) on the CPR cable mount (P).

18. Unscrew the CPR cable (D) from the CPR cable mount (P).

19. Remove the CPR cable (D) from the bed.

Replacement

WARNING:
Make sure the CPR cable is routed through the head section guide bracket correctly, right side to right handle, left side to left handle. Failure to do so could result in patient injury or equipment damage.

1. Perform the removal procedure in reverse order.

2. Make sure to route through the head section guide bracket correctly, right side to right handle, left side to left handle.

Adjustment

1. To add tension in the cable, loosen the two jam nuts (L) and move the cable sheath (R) toward the foot end of the bed to the point where the release mechanism on the head motor begins to move from the neutral position (see figure 4-9 on page 4-19).

2. To relieve tension in the cable, loosen the two jam nuts (L) and move the cable sheath (R) toward the head end of the bed to the point where the release mechanism on the head motor begins to move from the neutral position.

3. Stop at the point where the release mechanism begins to move from the neutral position.

4. Tighten the two jam nuts (L).

5. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.7 Knee Section Motor

Tools required: 13 mm socket
Ratchet
Extension
E-ring installation tool

Removal

1. Set the brakes.
2. Raise the sleep surface to the highest position.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
5. Remove the seat and knee sections.
6. Remove the two screws (A) and washers (B) securing the power supply cover (C) to the power supply (D) (see figure 4-10 on page 4-22).
7. On the power supply P.C. board, disconnect the knee section motor connector (number 5).
8. Remove the cable cover on the central rail and remove the knee section motor cable.
9. Remove the knee section motor cable from the bed.
10. Remove the E-ring (E) from the rod end pin (F) (see figure 4-11 on page 4-22).
11. Remove the E-ring (G) from the motor end pin (H).
12. While supporting the motor (J), remove the rod end pin (F).
13. While supporting the motor (J), remove the motor end pin (H).
14. Remove the knee motor (J) from the bed.

Figure 4-10. Power Supply

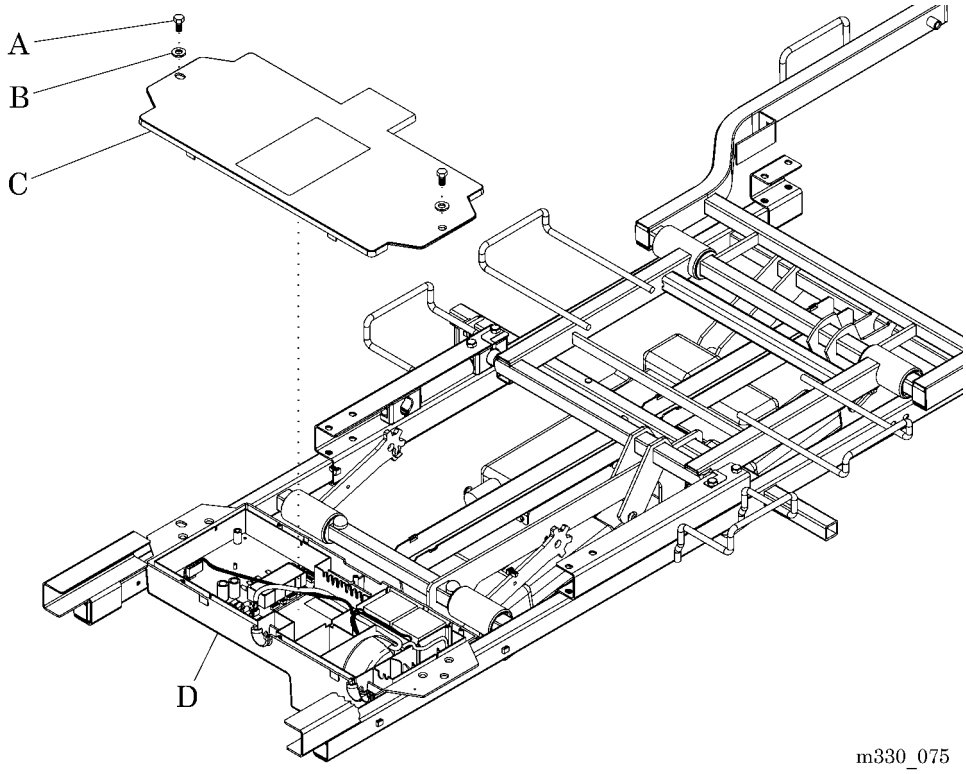
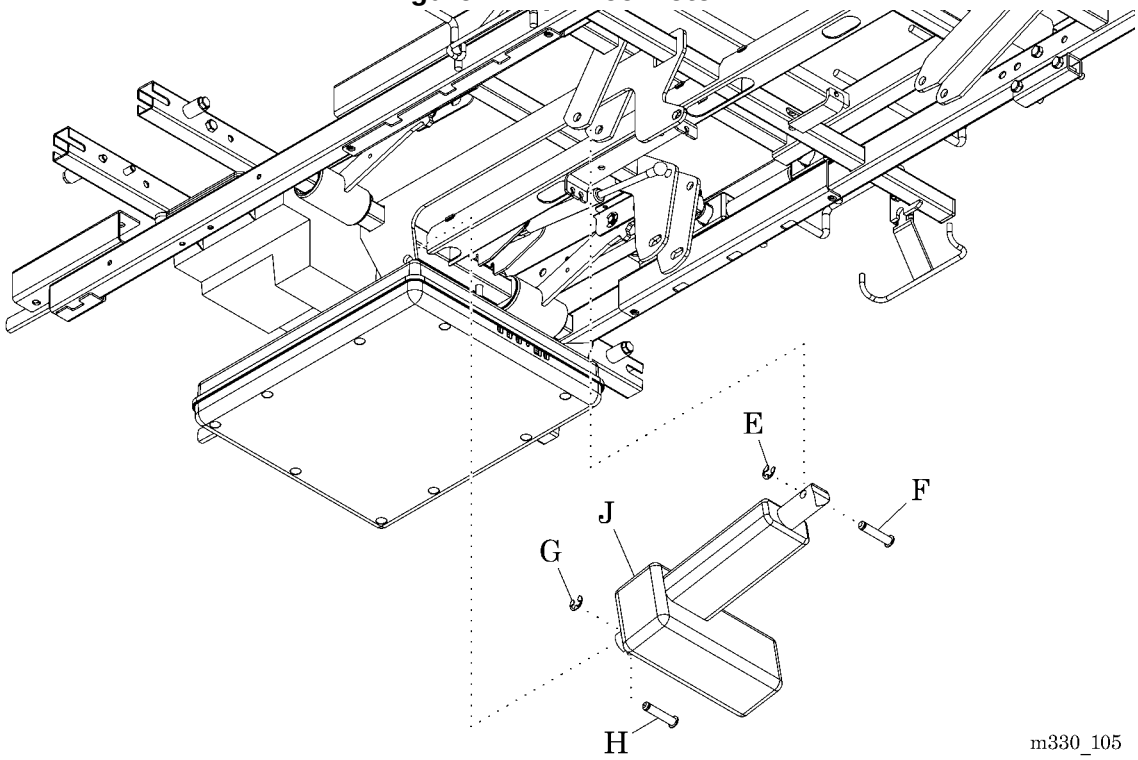


Figure 4-11. Knee Motor



Replacement

1. Perform the removal procedure in reverse order.

CAUTION:
Ensure that the elastic found on the new motors is not wound around the motor body before removing it (cut). If necessary, turn the motor end rod in the appropriate direction to unwind this elastic. Indeed, it is used to indicate the correct position of the switches and internal end of travels of the motor. The incorrect position of these elements may damage the motor or the structure of the bed.

2. Remove the elastic from the motor.

3. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.8 Foot Section Motor

Tools required: 13 mm socket
Ratchet
Extension
E-ring installation tool

Removal

1. Set the brakes.
2. Raise the sleep surface to the highest position.
3. Raise the head section to the highest position.
4. Remove the seat and knee sections.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

5. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
6. Remove the two screws (A) and washers (B) securing the power supply cover (C) to the power supply (D) (see figure 4-12 on page 4-25).
7. On the power supply P.C. board, disconnect the foot section motor connector (number 2).
8. Remove the cable cover on the central rail and remove the foot section motor cable.
9. Remove the foot section motor cable from the bed.
10. Remove the E-ring (E) from the rod end pin (F) (see figure 4-13 on page 4-25).
11. Remove the E-ring (G) from the motor end pin (H).
12. Remove the pin (F) and two plastic spacers (I).

NOTE:
Note the position of the plastic spacers for installation later.

13. Remove the motor end pin (H).

Figure 4-12. Power Supply

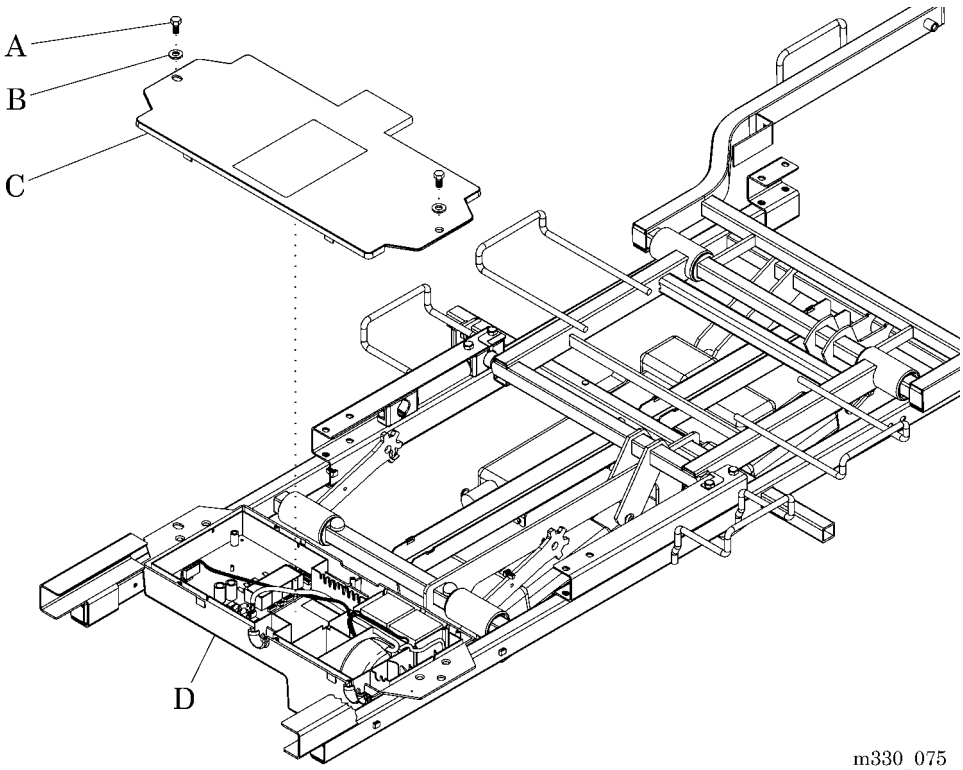
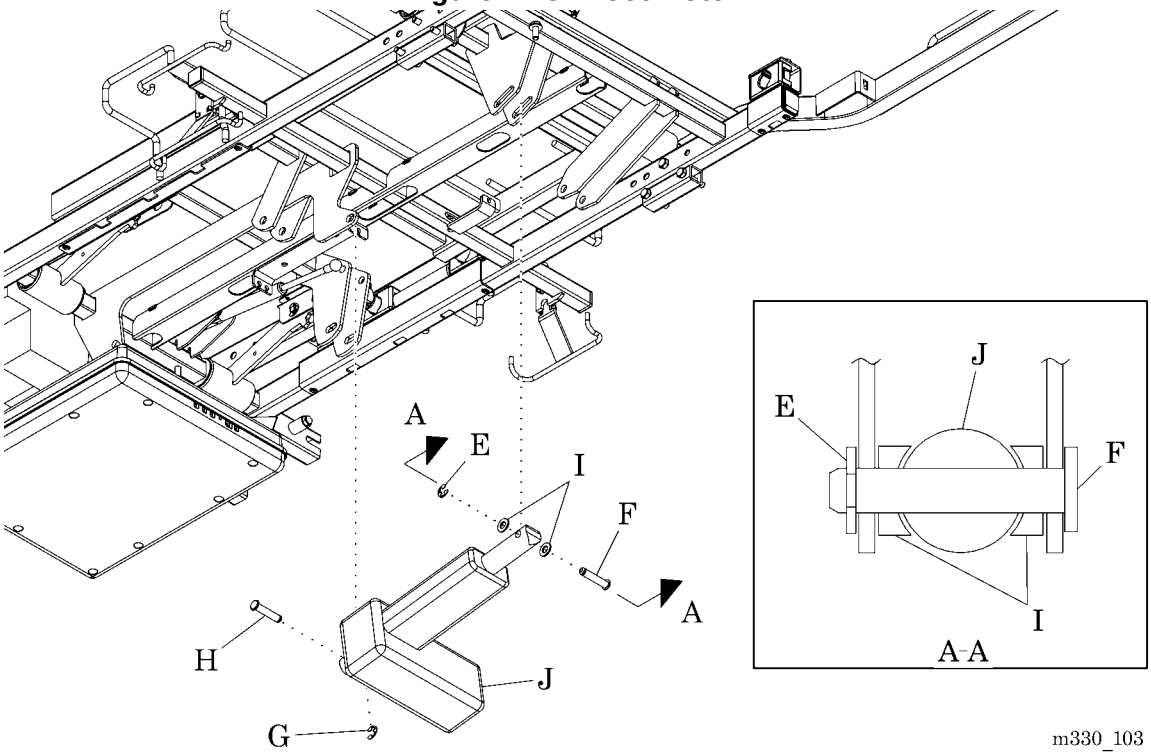


Figure 4-13. Foot Motor



14. Remove the foot motor (J) from the bed.

Replacement

1. Perform the removal procedure in the reverse order.

CAUTION:
Ensure that the elastic found on the new motors is not wound around the motor body before removing it (cut). If necessary, turn the motor end rod in the appropriate direction to unwind this elastic. Indeed, it is used to indicate the correct position of the switches and internal end of travels of the motor. The incorrect position of these elements may damage the motor or the structure of the bed.

2. Remove the elastic from the motor.

3. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.9 Head Hilow Column

Tools required: 13 mm socket
Ratchet
Extension
(2) Jack stands

Removal

1. Set the brakes.
2. Remove the headboard.
3. Raise the head section to the full up position.

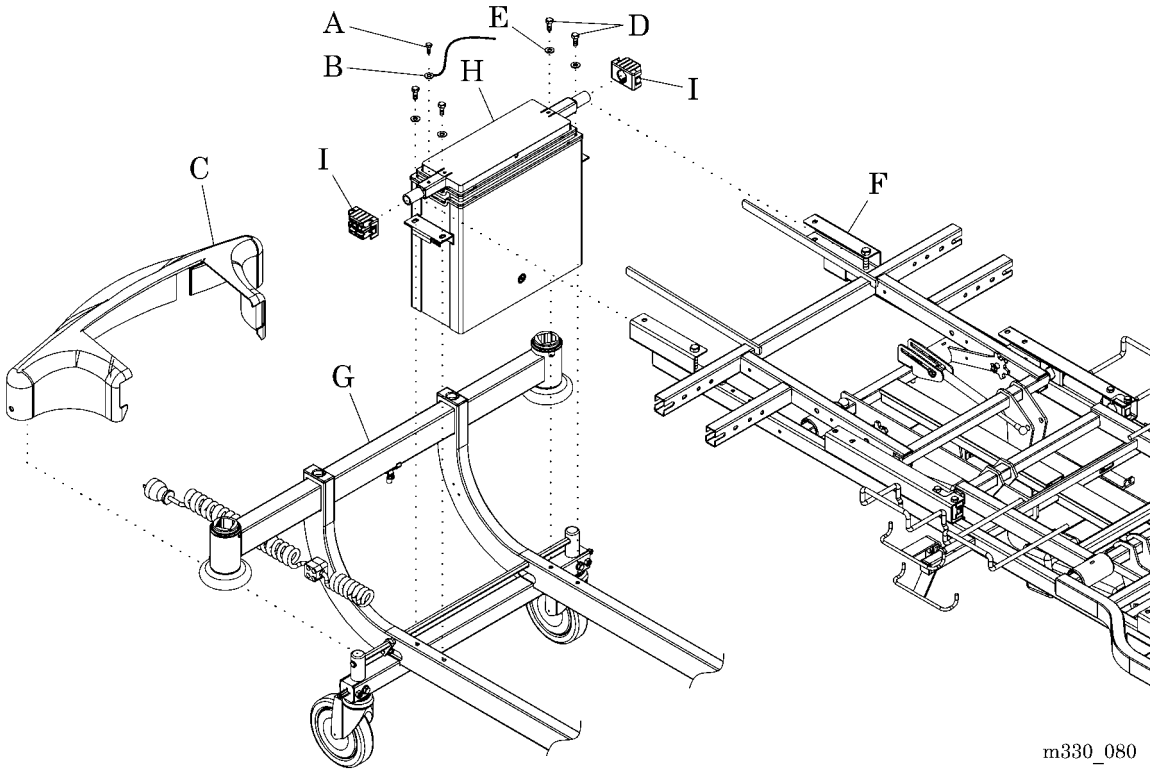
WARNING:
Do not work under an unsupported load. Install appropriate temporary supports. Failure to do so could result in personal injury or equipment damage.

4. Place the jack stands under the articulating frame.
5. Lower the articulating frame onto the jack stands.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

6. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
7. Remove the power supply cover.
8. Disconnect the head hilow column cable from the power supply P.C. board.
9. Remove the screw (A) securing the hilow column ground wire (B) to the hilow column (L).
10. Remove the head end base frame cover (C) (see figure 4-14 on page 4-28).

Figure 4-14. Head Hilow Column



11. Remove the four screws (D) and washers (E) securing the hilow column (H) to the frame (G).

12. Slide the hilow column (H) towards the head end of the bed to remove it from the guide rails (F).

13. Remove the hilow column (H) from the bed. frame (G).

14. Remove and retain the two plastic bearings (I).

Replacement

1. Position the new hilow column (H) on the bed frame (G) with the cable facing the foot end of the bed.

2. Install the two plastic bearings (I) onto the **new** column.

3. Connect the cable to the power supply P.C. board (connector 6).

4. Disconnect the **foot** hilow column from the power supply P.C. board.

5. Plug the bed into an appropriate power source.

6. Use the *Bed Hilow* control, to raise the hilow column to the same height as the bed.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

7. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.

8. Connect the foot hilow column to the power supply P.C. board.

9. Perform the removal procedure in reverse order.

10. Plug the unit into an appropriate power source.

11. Operate the Trendelenburg function to make sure there is no tension on the power supply cable of the column.

SHOCK HAZARD:
The equipotential link and the grounding of the metal parts of the bed depend on the correct installation of the earth conductor and grounding spring blades. Personal injury could result if the installation is not correct and/or if the earth continuity is compromised.

12. Check that the earth continuity of the accessible metal parts is correct (see “Earth resistance” on page 6-7 in the Preventive Maintenance Schedule).

13. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.10 Foot Hilow Column

Tools required: 13 mm socket
Ratchet
Extension
(2) Jack stands
Vice grips®[1]

Removal

1. Set the brakes.
2. Remove the footboard.
3. Raise the head section to the full up position.
4. Remove the seat section of the sleep deck.
5. Remove the thigh section of the sleep deck.

WARNING:
Do not work under an unsupported load. Install appropriate temporary supports. Failure to do so could result in personal injury or equipment damage.

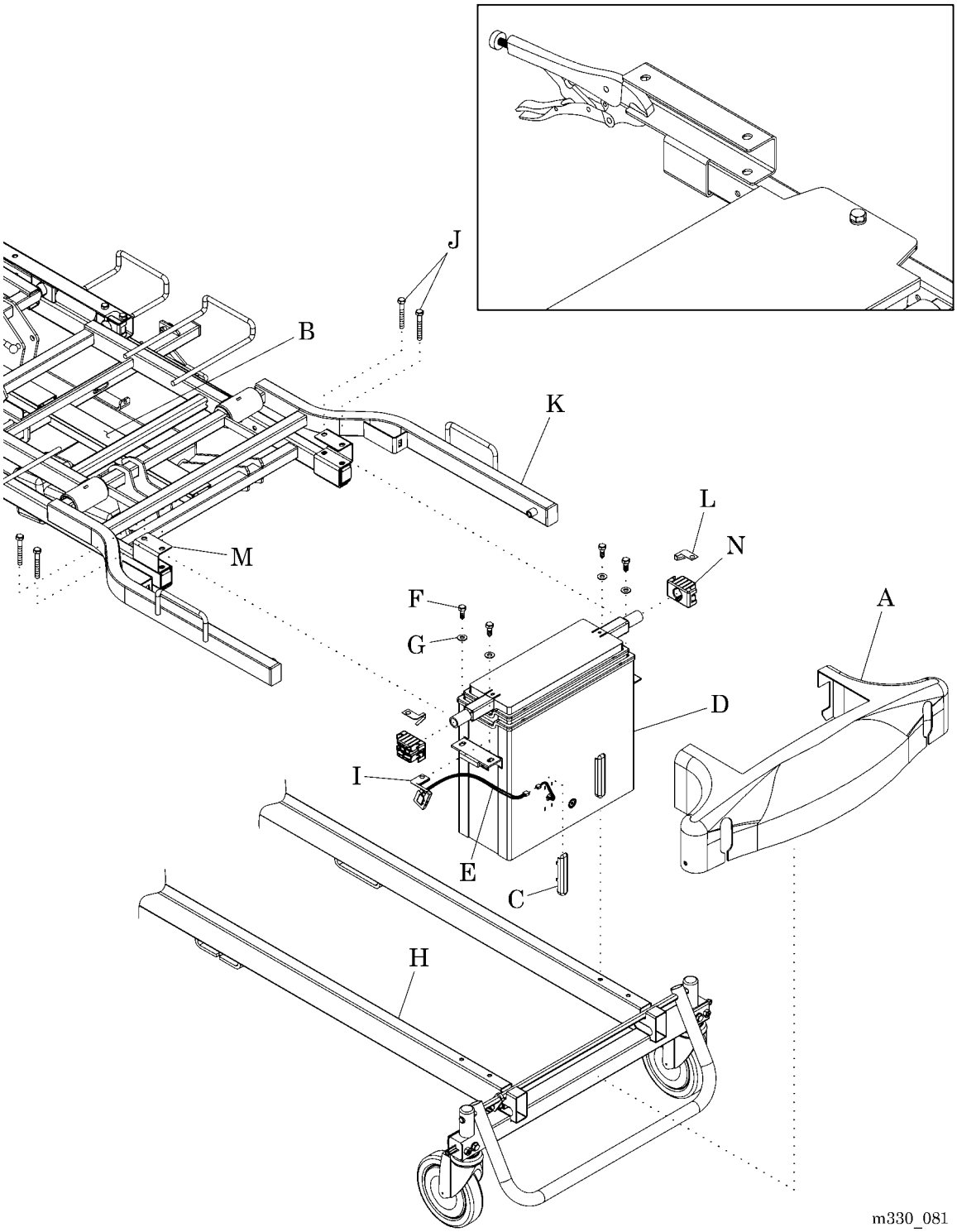
6. Place the jack stands under the articulating frame.
7. Lower the articulating frame onto the jack stands.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

8. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
9. Remove the power supply cover.
10. Disconnect the head hilow column cable from the power supply P.C. board.
11. Install the Vice Grips® into the head hilow channel (see figure 4-15 on page 4-31).

1. Vice grip® is a registered trademark of American Tool Companies, Inc.

Figure 4-15. Foot Hilow Column



12. Remove the foot frame cover (A).
13. Remove the cable cover (B) from the central rail.
14. Disconnect the foot hilow column cable from the extension cable inside the central rail.
15. Remove the cover (C) from the bottom of the foot hilow column (D).
16. Disconnect the brake detection switch cable (E).
17. Remove the four screws (F) and washers (G) securing the foot hilow column (D) to the bed frame (H).
18. Remove the brake detection switch (I).
19. Remove the four screws (J) securing the hilow column (D) to the articulating frame (K).
20. Remove the grounding plates (L).
21. Tilt the column (D) towards the foot end of the bed.
22. Slide the upper section to remove it from the guide rails (M).
23. Remove the column (D) from the bed.
24. Remove and retain the two plastic bearings (N).

Replacement

1. Position the new column (D) on the bed frame (H) with the two covers (C) toward the foot end of the bed.
2. Remove the cover (C) on the base of the **new** column.
3. Route the foot hilow column cable to the central rail.
4. Connect the hilow column cable to the extension cable inside the central rail.
5. Install the two plastic bearings (N) onto the new hilow column (D).
6. Plug the unit into an appropriate power source.
7. Operate the hilow function until the foot hilow column is the same height as the bed.

8. Perform the removal procedure in reverse order.

SHOCK HAZARD:
The equipotential link and the grounding of the metal parts of the bed depend on the correct installation of the earth conductor and grounding spring blades. Personal injury could result if the installation is not correct and/or if the earth continuity is compromised.

9. Check that the earth continuity of the accessible metal parts is correct (see "Earth resistance" on page 6-7 in the Preventive Maintenance Schedule).

10. To make sure the CareAssist™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.11 Brake Detection Switch

Tools required: Small screwdriver
13 mm socket
Ratchet
Extension

Removal

1. Set the brakes.
2. Raise the unit to the highest position.
3. Raise the right, foot end siderail to the up and locked position.

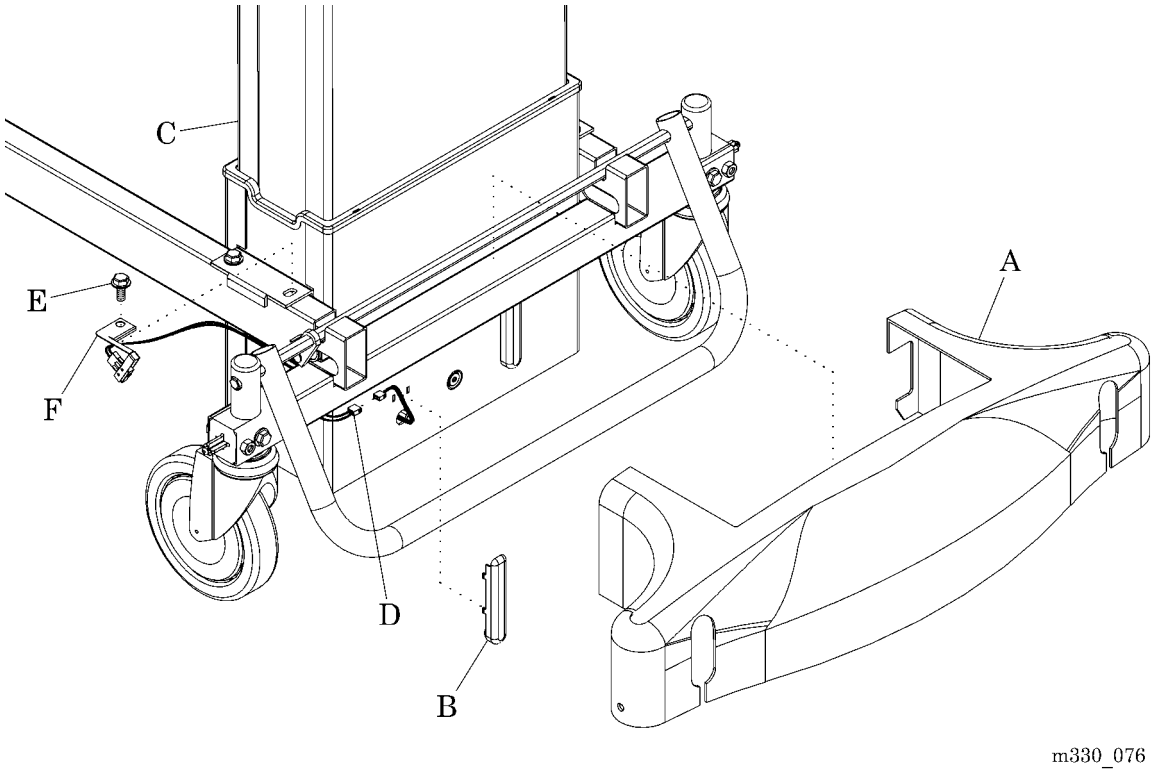
SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
5. Remove the foot frame cover (A) (see figure 4-16 on page 4-35).
6. Remove the cover (B) from the bed right side of the foot hilow column (C).
7. Disconnect the cable (D) from the brake detection switch (F).
8. Open the cable track located under the foot crossbar on the frame, and remove the brake detection switch cable.
9. Remove the screw (E) securing the brake detection switch (F) to the frame.
10. Remove the brake detection switch (F).

Replacement

1. Perform the removal procedure in reverse order.
2. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

Figure 4-16. Brake Detection Switch



4.12 Brake/Steer Bar

Tools required: 13 mm socket
Ratchet
Extension
13 mm wrench
10 mm hex key
8 mm pin punch
Soft faced hammer
(2) 4" x 4" x 2' piece of wood

Removal

1. Set the brakes.
2. Raise the unit to its highest position.

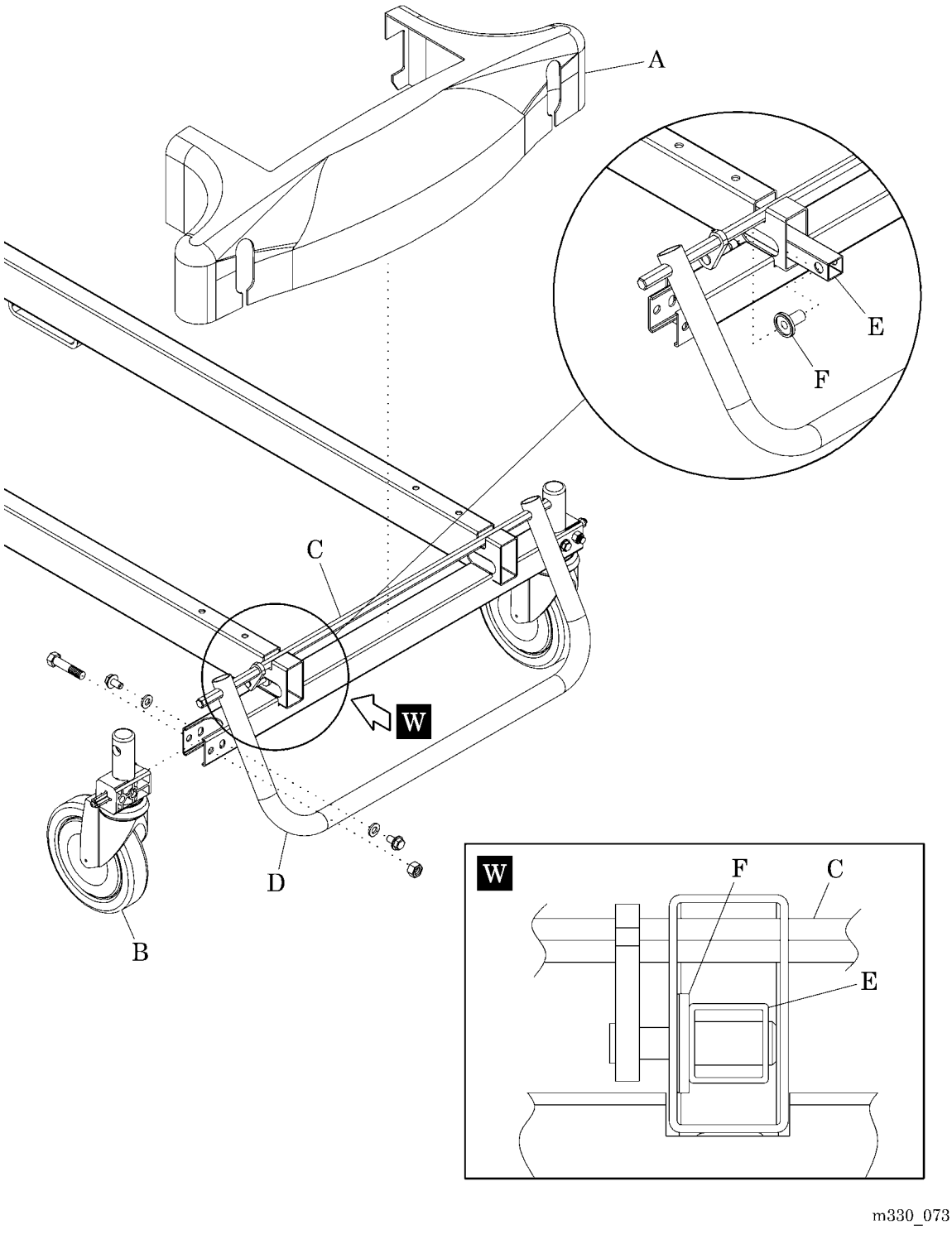
SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Remove the head frame cover.

WARNING:
Use proper lifting techniques. Failure to do so can result in personal injury or equipment damage.

5. Using a second person, lift the foot end of the unit and place a piece of wood under the foot hilow column.
6. Using a second person, lift the head end of the unit and place a piece of wood under head the hilow column.
7. Remove the foot frame cover (A) (see figure 4-17 on page 4-37).
8. Remove **both** right side casters (B) (refer to procedure 4.13).
9. From the left side of the bed, drive the brake bar hex rod (C) out of the left foot caster.

Figure 4-17. Brake Bar



NOTE:
Driving the brake bar hex rod out of the caster will break the white plastic bushing on the right side brake/steer tube.

10. Remove the foot end brake bar (D).

11. From the left side of the bed, drive the brake bar hex rod out of the left head caster.

NOTE:
Driving the brake bar hex rod from the caster will break the white plastic bushing on the right side brake/steer tube.

12. Remove the head end brake bar.

13. Remove the brake/steer link bar (E) from the frame.

14. Remove the plastic bushing (F) from the head and foot end brake bars.

Replacement

1. Insert the new bushings (F) into the brake/steer link bar (E).

2. Insert the brake/steer link (E) into the frame.

NOTE:
The plastic bushings will be between the brake/steer link bar and the frame.

3. Align the head end brake bar with the bushing in the brake/steer link bar (E).

4. Drive the head end brake bar into the brake/steer link bar (E), seating it inside the bushing.

5. Align the foot end brake bar (D) with the bushing in the brake/steer link bar (E).

6. Drive the foot end brake bar (D) into the brake/steer link bar (E), seating it inside the bushing.

7. Install the casters (B) (refer to procedure 4.13).

8. Install the head and foot frame covers.

WARNING:
Use proper lifting techniques. Failure to do so can result in personal injury or equipment damage.

9. Using a second person, remove the pieces of wood from under the hilow columns.

10. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.13 Caster

Tools required: 13 mm socket
Ratchet
Extension
10 mm hex key
Soft faced hammer
Medium screwdriver
Scissor jack

Removal

NOTE:
The removal and replacement procedure is the same for both the head and foot end casters.

1. Set the brakes.
2. Raise the bed to the highest position.

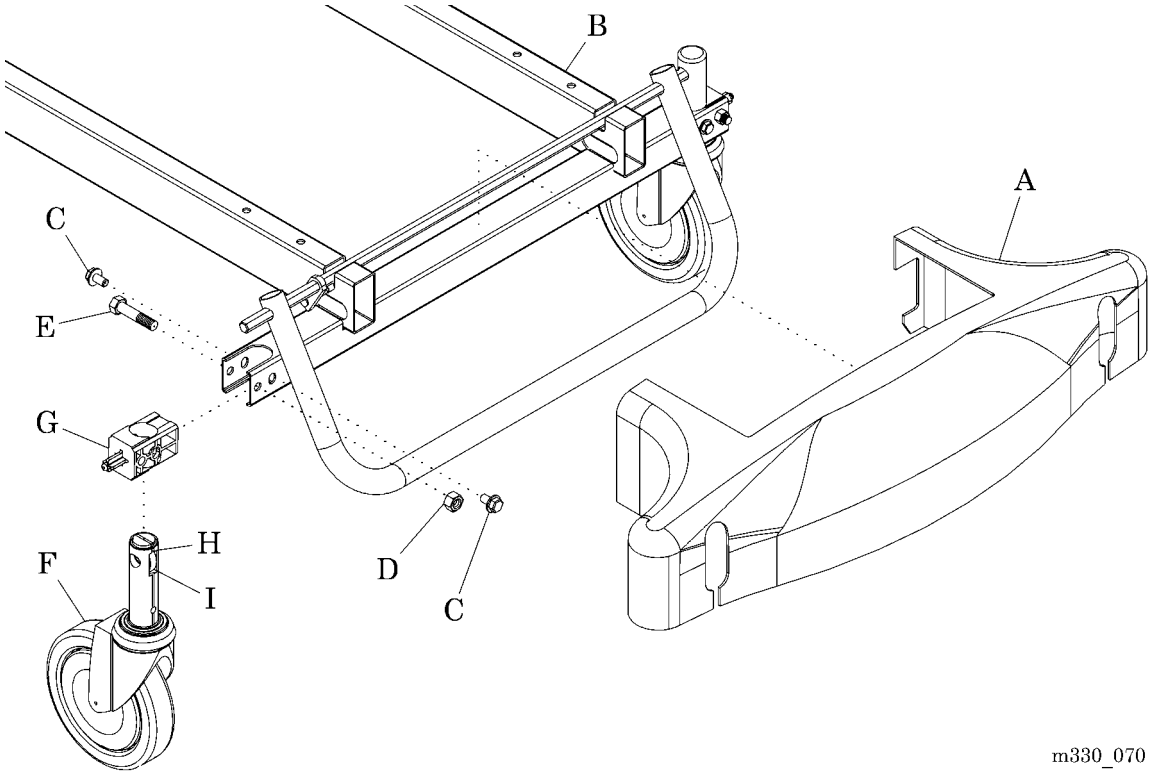
SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Depending on the caster to be replaced, remove the head or foot frame cover (A) from the bed (B) (see figure 4-18 on page 4-41).
5. Using the scissor jack, raise the bed high enough to remove the caster .
6. Remove the two alignment bolts (C).
7. Remove the nut (D) and bolt (E).
8. Slide the caster (F) and socket (G) out.

NOTE:
When the caster disengages from the brake bar hex rod, it will fall from the socket.

9. Remove the caster (F) from the socket (G).

Figure 4-18. Caster



Replacement

NOTE:
Brake/steer casters have a black washer on top. Brake casters have a silver plated washer on top.

1. Hold the new caster (F) so the window (I) with the cam (H) showing is towards the foot end of the bed.

2. Insert the new caster (F) into the socket (G) so the window with the cam showing is towards the foot end of the bed.

WARNING:
Ensure the caster is correctly positioned with respect to the movements of the hexagonal bar. Failure to do so may cause the brake and steer system to malfunction. Personal injury or equipment damage could occur.

3. Install the new caster (F) and socket (G) into the bed (B) so the window with the cam showing is towards the foot end of the bed.

4. Install the two alignment bolts (C).
5. Install the bolt (E) and nut (D) through the socket (G).
6. Make sure that the new caster is braked.
7. If the caster is not braked, do the following:
   a. Remove the caster.
   b. Rotate the cam inside the caster clockwise until the caster is braked.
   c. Install the caster.
   d. Make sure the new caster is braked.
   e. Repeat as needed.
8. Install the applicable head or foot frame cover (A).
9. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.14 SideCom® Communication System P.C. Board

Tools required: T15 Torx®[1] screwdriver
T25 Torx® screwdriver

Removal

1. Set the brakes.
2. Raise the unit to its highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

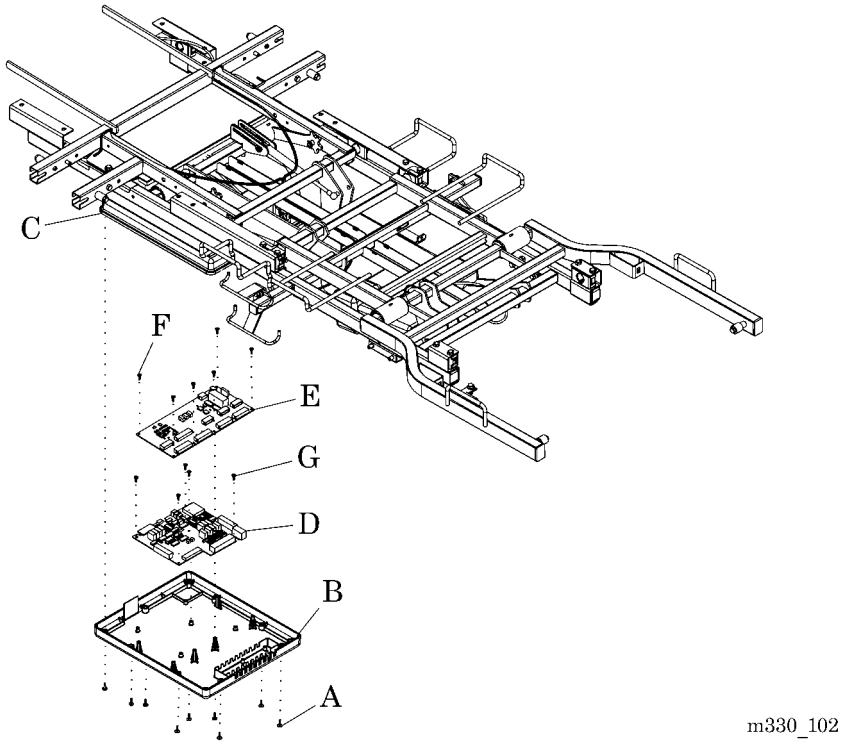
3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.

NOTE:
The SideCom® Communication System P.C. board is mounted on the interface box cover.

4. Remove the nine screws (A) securing the interface box cover (B) to the interface box (C) (see figure 4-19 on page 4-44).
5. Lower the box cover (B).
6. Disconnect all cables from the SideCom® Communication System P.C. board (D) and interface P.C. board (E).
7. Remove the six screws (F) securing the interface P.C. board (E) to the box cover (B).
8. Remove the five screws (G) securing the SideCom® Communication System P.C. board (D) to the box cover (B).
9. Remove the SideCom® Communication System P.C. board (D).

1. Torx® is a registered trademark of Textron, Inc.

Figure 4-19. SideCom® Communication System P.C. Board



Replacement

1. Perform the removal procedure in reverse order.
2. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.15 Interface P.C. Board

Tools required: T15 Torx®[1] screwdriver
T25 Torx® screwdriver

Removal

1. Set the brakes.
2. Raise the unit to its highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

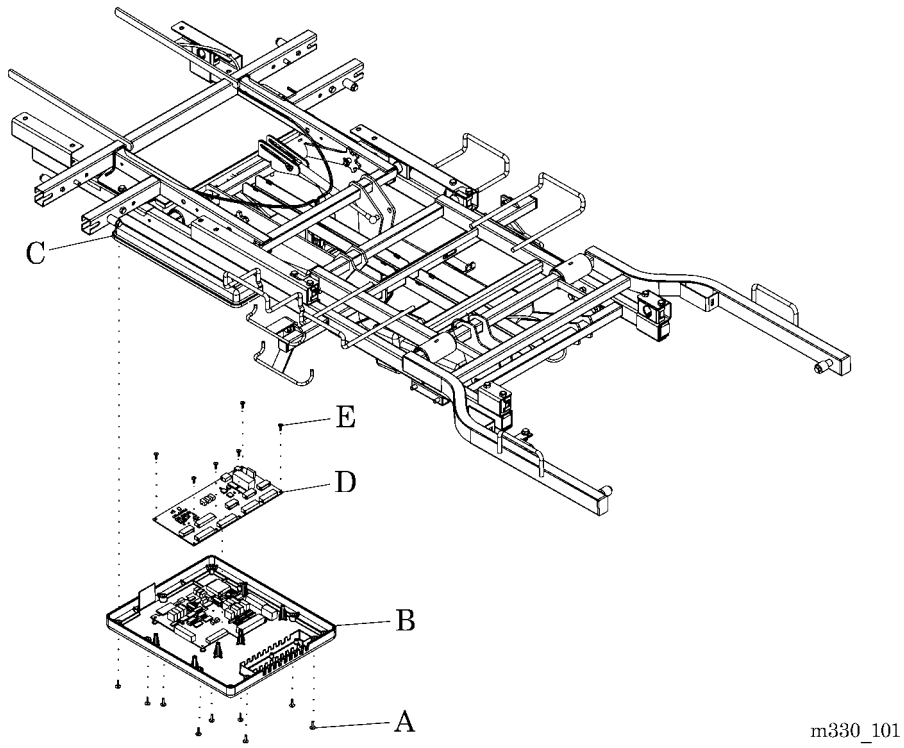
3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.

NOTE:
The interface P.C. board is mounted on the interface box cover.

4. Remove the nine screws (A) securing the interface box cover (B) to the interface box (C) (see figure 4-20 on page 4-46).
5. Lower the box cover (B).
6. Disconnect all cables from the interface P.C. board (D).
7. Remove the six screws (E) securing the interface P.C. board (D) to the box cover (B).
8. Remove the interface P.C. board (D).

1. Torx® is a registered trademark of Textron, Inc.

Figure 4-20. Interface P.C. Board



Replacement

1. Perform the removal procedure in reverse order.

1. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.16 Fuses

Tools required: T15 Torx®[1] screwdriver
T25 Torx® screwdriver
13 mm socket
Ratchet

Removal

1. Set the brakes.
2. Raise the unit to its highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Remove the two screws (A) and washers (B) from the power supply cover (C) (see figure 4-21 on page 4-48).
5. Remove the cover (C).
6. For AC power fuses (E) , do the following:
   a. Remove the fuse cover (D) from the AC power P.C. board (F).
   b. Remove the fuses (E).
7. For the battery fuse (I), do the following:
   a. Locate the battery cable (G).
   b. Locate the inline fuse holder (H) on the battery cable (G).
   c. Open the inline fuse holder (H) by twisting the two halves in opposite directions.
   d. Remove the fuse (I).

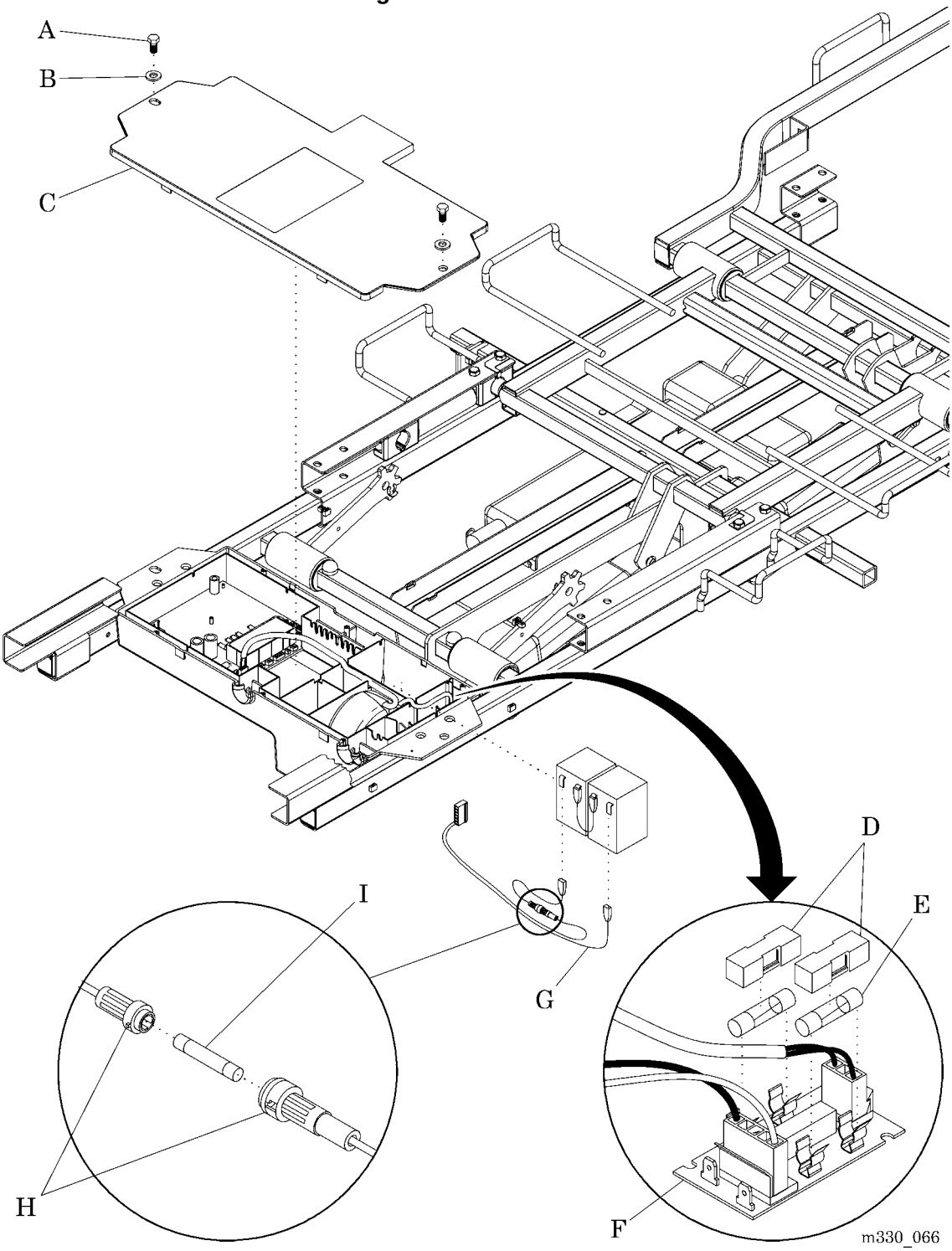
Replacement

1. Perform the removal procedure in reverse order.

1. Torx® is a registered trademark of Textron, Inc.

2. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

Figure 4-21. Fuses



4.17 Siderail Control P.C. Board

Tools required: T25 Torx®[1] screwdriver
T15 Torx® screwdriver
Screwdriver
Isopropyl alcohol
Rags

NOTE:
Removing the switch panel from the siderail requires the installation of a new switch panel.

Removal

1. Set the brakes.
2. Raise the unit to its highest position.
3. Raise the siderail to the up and locked position

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

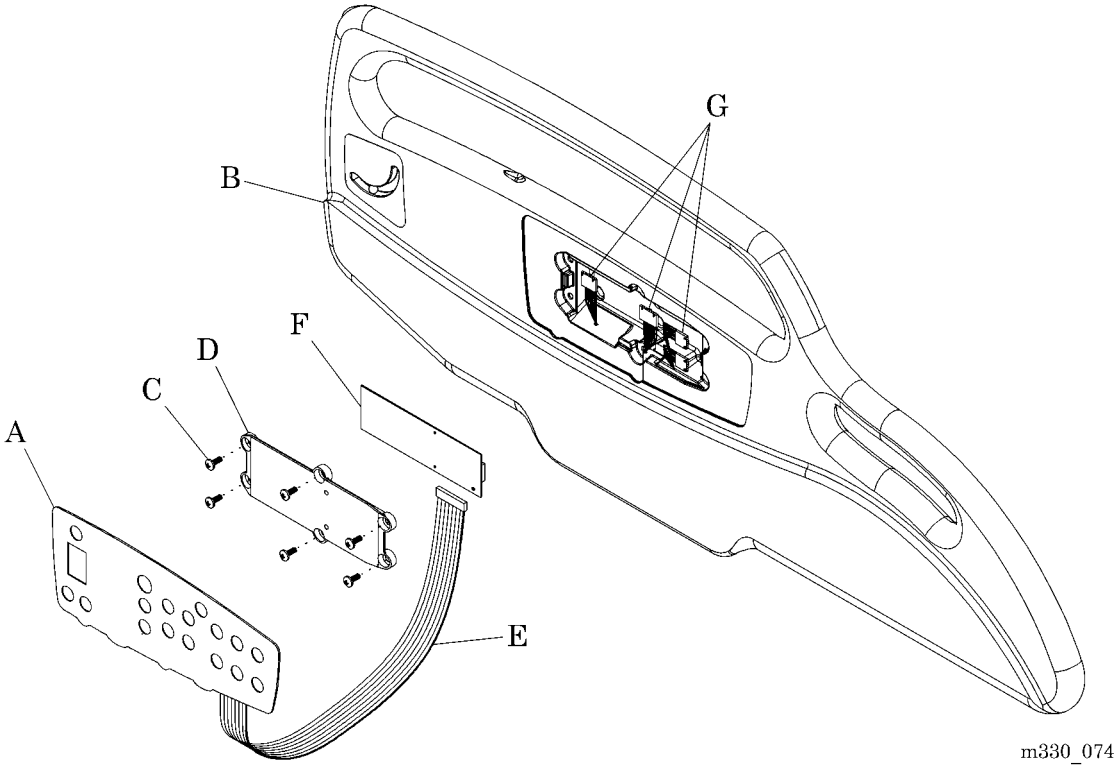
4. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.

CAUTION:
Use extreme care when removing the switch panel. Failure to do so could cause damage to the seating area of the switch panel on the siderail.

5. Starting on the bottom edge, remove the switch panel (A) from the siderail (B) (see figure 4-22 on page 4-50).
6. Remove the six screws (C) securing the stiffener (D) to the siderail (B).
7. Disconnect the switch panel cable (E) from the siderail control P.C. board (F).
8. Disconnect the siderail cables (G) from the siderail control P.C. board (F).
9. Remove the siderail P.C. board (F) from the stiffener (D).

1. Torx® is a registered trademark of Textron, Inc.

Figure 4-22. Siderail Control P.C. Board



WARNING:
Isopropyl alcohol is flammable and toxic to skin, eyes, and the respiratory tract. Do not use near an open flame. Do not use in confined areas. Personal injury may occur.

10. Using rags and isopropyl alcohol, clean the mounting area where the switch panel (A) was located.

Replacement

1. Connect the new switch panel cable (E) to the siderail control P.C. board (F).
2. Connect the siderail cables (G) to the siderail control P.C. board (F).
3. Install the siderail control P.C. board (F) onto the stiffener (D).
4. Install the stiffener (D) into the siderail (B).
5. Install the six screws (C) to secure the stiffener (D) to the siderail (B).

6. Remove the wax paper backing from the new switch panel (A).
7. Install the new switch panel (A) onto the siderail (B).
8. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.18 Patient Pendant

Tools required: Small blade screwdriver

Removal

1. Set the brakes.
2. Raise the sleep surface to the highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
4. Disconnect the pendant cable from pendant mount on the bed.
5. Remove the pendant from the bed.

Replacement

1. Make sure the new pendant has the same functions as the pendant being replaced.
2. Perform the removal procedure in reverse order.
3. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.19 Patient Pendant Mount

Tools required: Wire cutters

NOTE:
This procedure is for moving the pendant mount from one side of the bed to the other side of the bed.

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.

3. Remove the pendant (refer to procedure 4.18).

4. Cut and remove the cable ties securing the pendant mount to the bed.

Replacement

1. Move the pendant mount to the opposite side of the bed.

2. Using cable ties, secure the pendant mount to the bed.

3. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.20 Bed Exit Switch

Tools required: Soft faced hammer
3/32" punch

Removal

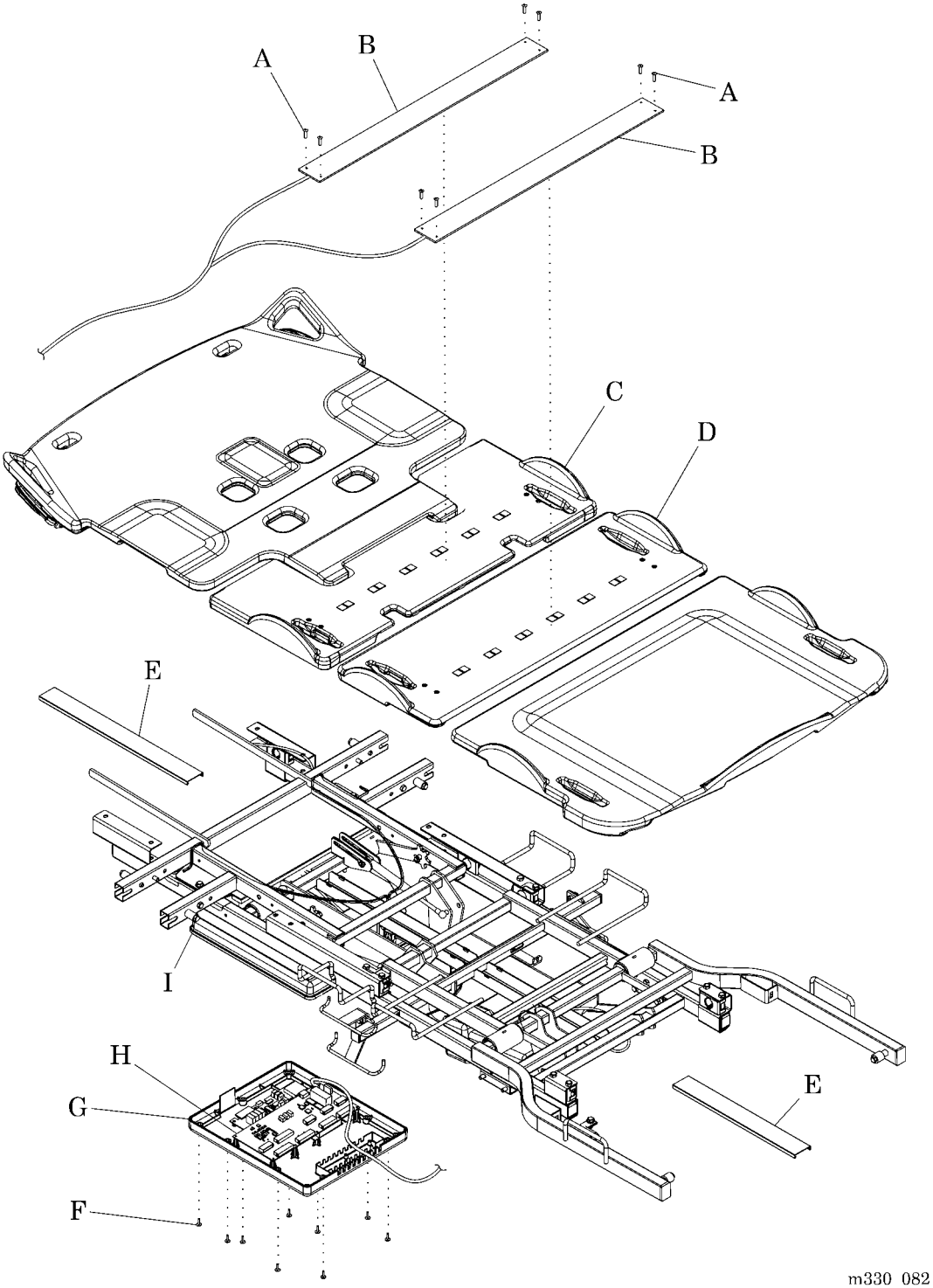
NOTE:
The tape switch assembly consists of two tape switches connected to a single cable, if one tape switch is inoperable, both tape switches must be replaced.

1. Set the brakes.
2. Raise the sleep surface to a comfortable working level.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the unit from its power source. Let the unit to sit for 60 seconds for the battery to time out.
5. Lower the right side siderails.
6. Using the punch, punch out the center of the four rivets (A) securing the switch (B) to the seat section (C) (see figure 4-23 on page 4-55).
7. Remove the switch (B).
8. Using the punch, punch out the center of the four rivets (A) securing the switch (B) to the thigh section (D).
9. Remove the switch (B).
10. Remove the seat section (C) and knee section (D).
11. Remove the two cable covers (E) from the central rail.
12. Remove the nine screws (F) securing the interface box cover (G) to the interface box (I).
13. Lower the cover (G).
14. Disconnect the switch cable from the interface P.C. board (H).

Figure 4-23. Bed Exit Switch



15. Remove the switch cable from the central rail.

16. Remove the switches (B) from the bed.

Replacement

NOTE:
The tape switch assembly consists of two tape switches connected to a single cable that connects to the interface P.C. board.

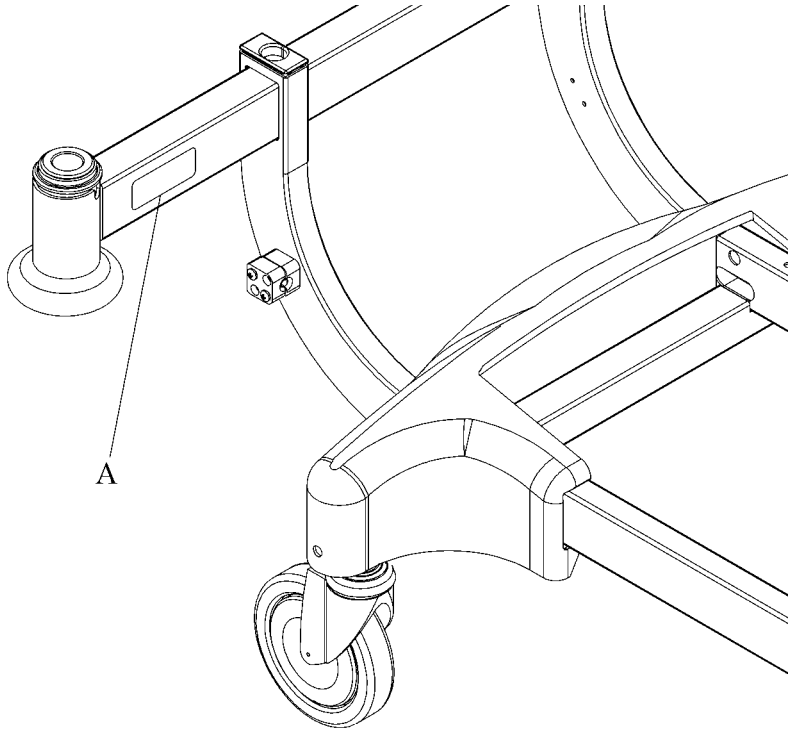
1. Route the switch cable through the central rail toward the head end of the bed to the interface box (I).
2. Connect the switch cable to connector P13 on the interface P.C. board (H).
3. Install the nine screws (F), to secure the interface box cover (G) to the interface box (I).
4. Lay one switch (B) on the seat section (C).
5. Install four plastic rivets (A) to secure the switch (B) to the seat section (C).
6. Lay the other switch (B) on the knee section (D).
7. Install four plastic rivets (A) to secure the switch (B) to the knee section (D).
8. To make sure the CareAssist™ Bed operates correctly, do the “Function Checks” on page 2-6.

Chapter 5
Parts List

Service Parts Ordering

Using the parts lists in this manual, identify the part number(s) you require. Find the product number and serial number on the product identification label (A) (see figure 5-1 on page 5-1).

Figure 5-1. Product Identification Label Location



5

Call Hill-Rom Technical Support at (800) 445-3720 with the following information:

- Customer account number
- Purchase order number
- Product number
- Serial number
- Part number(s)

To promptly order parts, request part prices and availability, or follow up on a service order, use the following Hill-Rom fax number:

(812) 934-8472

Terms:

- Net 30 days
- F.O.B. Batesville, IN
- Prepaid shipping charges added to invoice
- All orders shipped ground transportation unless specified

Address all inquiries to:

ATTN TECHNICAL SUPPORT—PARTS
HILL-ROM COMPANY, INC.
1069 STATE ROUTE 46 E
BATESVILLE IN 47006-9167

Address all return goods to:

ATTN SERVICE STORES
DISTRIBUTION CENTER DOOR D23
HILL-ROM COMPANY, INC.
COUNTY ROAD 300E
BATESVILLE IN 47006-9167

NOTE:
To eliminate possible delays or incorrect billings, **do not** return any items without a Return Material Authorization (RMA) number. When a return is requested, an RMA packet is included with each order. This packet includes an RMA number, instructions, and a shipping label. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Exchange Policy

The following are policies for in-warranty and out-of-warranty exchanges from Hill-Rom.

In-Warranty Exchanges

In some cases, Hill-Rom will request that parts/products be returned for inspection. When this occurs, you are expected to return parts/products within 30 days of receipt of the exchange part. If you fail to return the inoperative parts/products within the 30 day period, Hill-Rom will invoice your facility for the full selling price of the parts/products.

NOTE:
The preceding billing procedure pertains **only** to parts/products that Hill-Rom requests to be returned.

In some cases, the invoice accompanying the parts will show the full selling price (only for internal use at Hill-Rom). Do not confuse this price with your price.

Do not return any parts without an RMA number. When parts/products have been requested to be returned, Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Out-of-Warranty Exchanges

You are expected to return the inoperative parts/products within 30 days of receipt of the exchange part. Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720. Hill-Rom will invoice your facility for the full selling price of the parts/products. Upon return of the inoperative parts/products, Hill-Rom will issue a credit to your facility for **the difference between the exchange price and the full selling price of the parts/products**.

Warranty

HILL-ROM COMPANY, INC.
LIMITED WARRANTY

Hill-Rom Company, Inc. (Hill-Rom) has a long tradition of providing superior products and service to our customers. Our goal is "Total Customer Satisfaction". In that spirit, Hill-Rom is proud to offer the following warranty.

GENERAL WARRANTY (APPLICABLE UNLESS A SPECIFIC WARRANTY IS LISTED)

Hill-Rom warrants to the original purchaser that its products and replacement parts shall be free from defects in material and workmanship for a period of one (1) year from date of delivery. Hill-Rom's obligation under this warranty is expressly limited to supplying replacement parts and/or service for, or replacing, at its option, any product which is, in the sole discretion of Hill-Rom, found to be defective. In addition to the foregoing one year warranty, Hill-Rom warrants to the original purchaser that the frame and welds on its products will be free from structural defects for the life of the product. Any product upgrade or modification initiated by Hill-Rom does not affect the original product warranty.

SPECIFIC WARRANTIES

MATTRESS WARRANTIES

Hill-Rom warrants to the original purchaser that its mattress product shall be free from defects in material and workmanship for a period of two (2) years from date of delivery. However, electro mechanical mattress components (compressors, valves, printed circuit boards, hoses, and couplers) are covered by the general one (1) year warranty.

EXPENDABLES WARRANTIES

A sixty (60) day limited warranty from date of delivery applies to expendable parts such as cushions, coverlets, software diskettes, locator badge batteries, dome light incandescent bulbs, overhead fluorescent tubes, heating elements, temperature probes, filter sheets, and microspheres. This warranty is limited to replacement of the parts covered.

TO OBTAIN PARTS AND SERVICE

In the United States, call Hill-Rom Technical Support Department at (800) 445-3720, Monday through Friday. In Canada, call Hill-Rom Technical Support Department at (800) 267-2337, Monday through Friday. Outside the United States and Canada, call your authorized Hill-Rom Distributor. In order to expedite service, we request you furnish the following information: customer identification number, product model number, serial number, and description of problem. A qualified specialist will provide, via telephone (United States and Canada), or FAX (Outside the United States and Canada), troubleshooting assistance for facility personnel and provide necessary parts to make repairs. If troubleshooting determines the need for on-site technical service, a qualified service representative will be dispatched. Replacement of non-technical items will be the responsibility of the customer. If requested by Hill-Rom, products or parts for which a warranty claim is made shall be returned prepaid to Hill-Rom's factory.

OUT OF WARRANTY EXCHANGE POLICY

After the expiration of the original warranty, upon request, Hill-Rom will ship as a replacement, components such as selected: motors and printed circuit boards, for like units returned to Hill-Rom by the original purchaser at a substantial savings. Please call Hill-Rom Technical Support Department for current pricing.

PARTS AVAILABILITY POLICY

Hill-Rom will offer parts for new and remanufactured products for ten (10) years from date of sale; for communications products for five (5) years from date of sale.

Note: Some original component parts and assemblies may not be available; functional equivalents may be substituted.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE. HILL-ROM'S OBLIGATION UNDER THESE WARRANTIES SHALL NOT INCLUDE ANY LIABILITY FOR LOSS OF PROFITS, DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES OR DELAYS. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply. Any improper or negligent use, any alterations or repairs not in accordance with Hill-Rom's manuals or performed by others in such manner as in Hill-Rom's sole judgment affects the product materially and adversely, shall void these warranties. These warranties do not cover failures due to misuse, abuse, neglect, or lack of routine maintenance. No employee or representative of Hill-Rom is authorized to change these warranties in any way or grant any other warranty unless in writing and signed by a Hill-Rom officer. These warranties provide specific legal rights; but, there may be other available rights, which vary from state to state, province to province, or country to country.

Revised July 6, 2001

Hill-Rom Company, Inc., 1069 State Route 46 E, Batesville, IN 47006-9167

NOTES:

Recommended Spare Parts

For a recommended spare parts list to service five or more units, see table 5-1 on page 5-6.

Table 5-1. Recommended Spare Parts

Part Number	Quantity	Description
71073 (1170)	1	Pendant, without SideCom® Communication System
72781 (1170)	1	Pendant, with SideCom® Communication System
128593 (1170)	2	Fuse, AC
128594 (1170)	2	Fuse, battery
128595 (1170)	2	Fuse, SideCom® Communication System
72992 (1170)	1	Power cord with confirmer
VE0137C (1170)	1	Head motor
VE0138C (1170)	1	Thigh motor
VE0139B (1170)	1	Foot motor
AG0036 (1170)	1	Hilow column
71434 (1170)	1	P.C. board assembly, siderail interface
71667 (1170)	1	P.C. board assembly, SideCom® Communication System (universal television (UTV) junction)
71377 (1170)	1	Cable assembly, interconnect
AG0034 (1170)	2	Brake detection switch
RO0108A (1170)	1	Caster, brake
RO0110A (1170)	1	Caster, brake/steer
71460 (1170)	1	Power supply
38827 (1170)	1 can	Paint, light neutral

Part Number	Quantity	Description
71535 (1170) or 71646 (1170) or 71644 (1170)	1 1 1	Label, siderail control, rh, with bed exit and nurse call Label, siderail control, rh, bed function only Label, siderail control, rh, with bed exit, but no nurse call
71538 (1170) or 71647 (1170) or 71645 (1170)	1 1 1	Label, siderail control, lh, with bed exit and nurse call Label, siderail control, lh, bed function only Label, siderail control, lh, with bed exit, but not nurse call

Base Frame

Figure 5-2. Base Frame

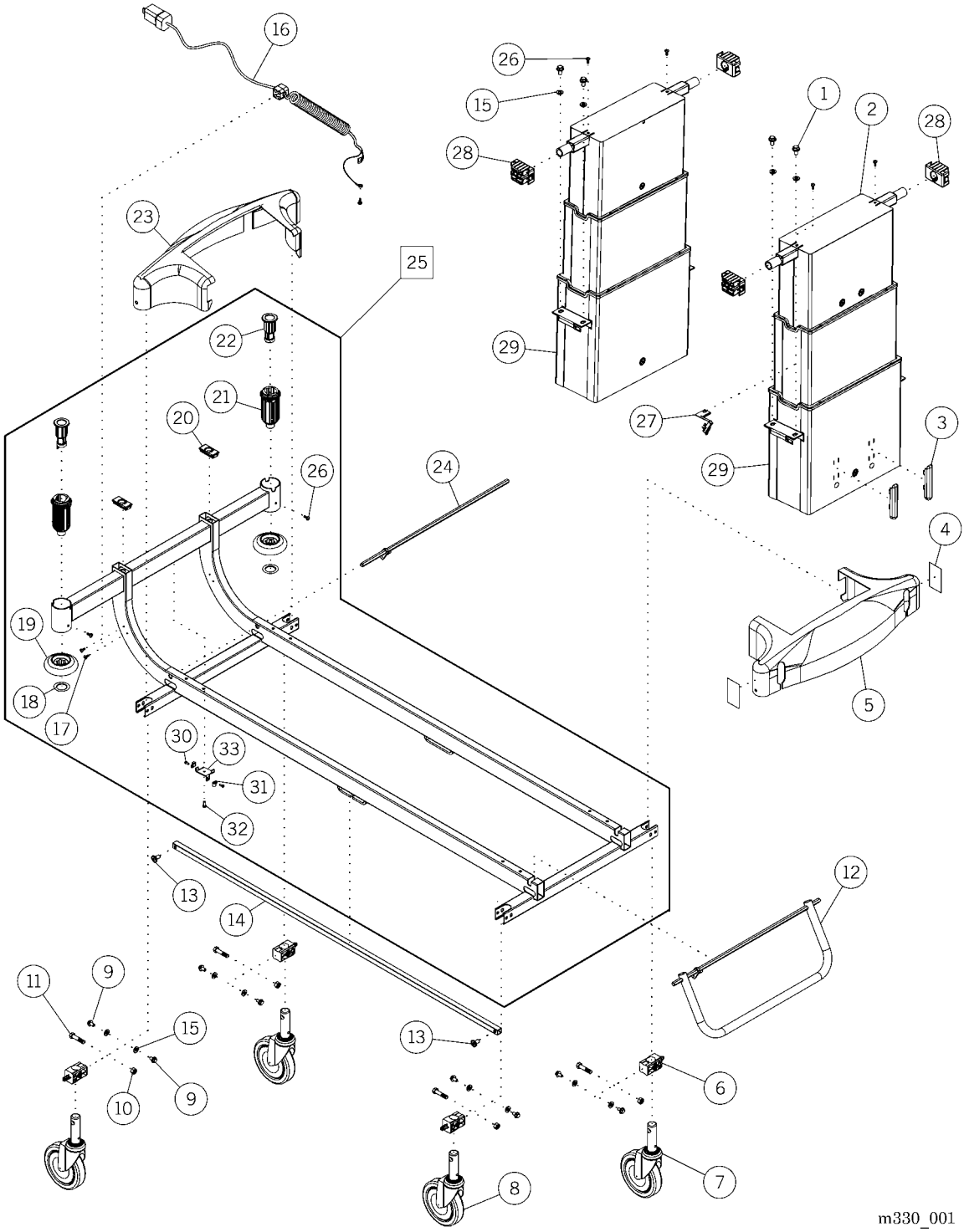


Table 5-2. Base Frame

Item Number	Part Number	Quantity	Description
1	VI0610A (1170)	8	Screw
2	CA0010 (1170)	2	Cover, hilow column, painted
3	S30545K (1170)	4	Cover
4	71649 (1170)	1	Label, brake/steer position, lh
	71788 (1170)	1	Label, brake/steer position, rh
5	CA0011 (1170)	1	Foot end brake cover
6	S30528K (1170)	4	Caster support
7	RO0110A (1170)	1	Caster, brake/steer
8	RO0108A (1170)	3	Caster, brake, anti-static
9	VI0326 (1170)	8	Screw
10	VI0361 (1170)	4	Nut
11	VI0020 (1170)	4	Bolt
12	CA0002 (1170)	1	Brake/steer pedal
13	S30527K (1170)	2	Plastic bushing
14	F11203A (1170)	1	Brake bar
15	VI0616A (1170)	16	Washer
16	72992 (1170)	1	Power cord with confirmer
17	VI0093 (1170)	2	Screw
18	QD0663 (1170)	2	Push nut
19	71082 (1170)	2	Bumper
20	S30526K (1170)	2	End cover
21	S30283B (1170)	2	Accessory socket
22	71438 (1170)	2	Adapter, IV pole
23	CA0012 (1170)	1	Head end brake cover
24	CA0003 (1170)	1	Brake rod, head
25	CA0006 (1170)	1	Base frame assembly
26	VI0613A (1170)	4	Screw
27	AG0034 (1170)	1	Brake detection switch
28	S30531K (1170)	8	Plastic bearing
29	AG0036 (1170)	2	Hilow column

Item Number	Part Number	Quantity	Description
30	VI0613 (1170)	2	Screw
31	72976 (1170)	2	Cable clamp
32	VI0344 (1170)	1	Screw
33	CA0023 (1170)	1	SideCom® Communication System cable bracket, painted

NOTES:

Articulating Frame

Figure 5-3. Articulating Frame

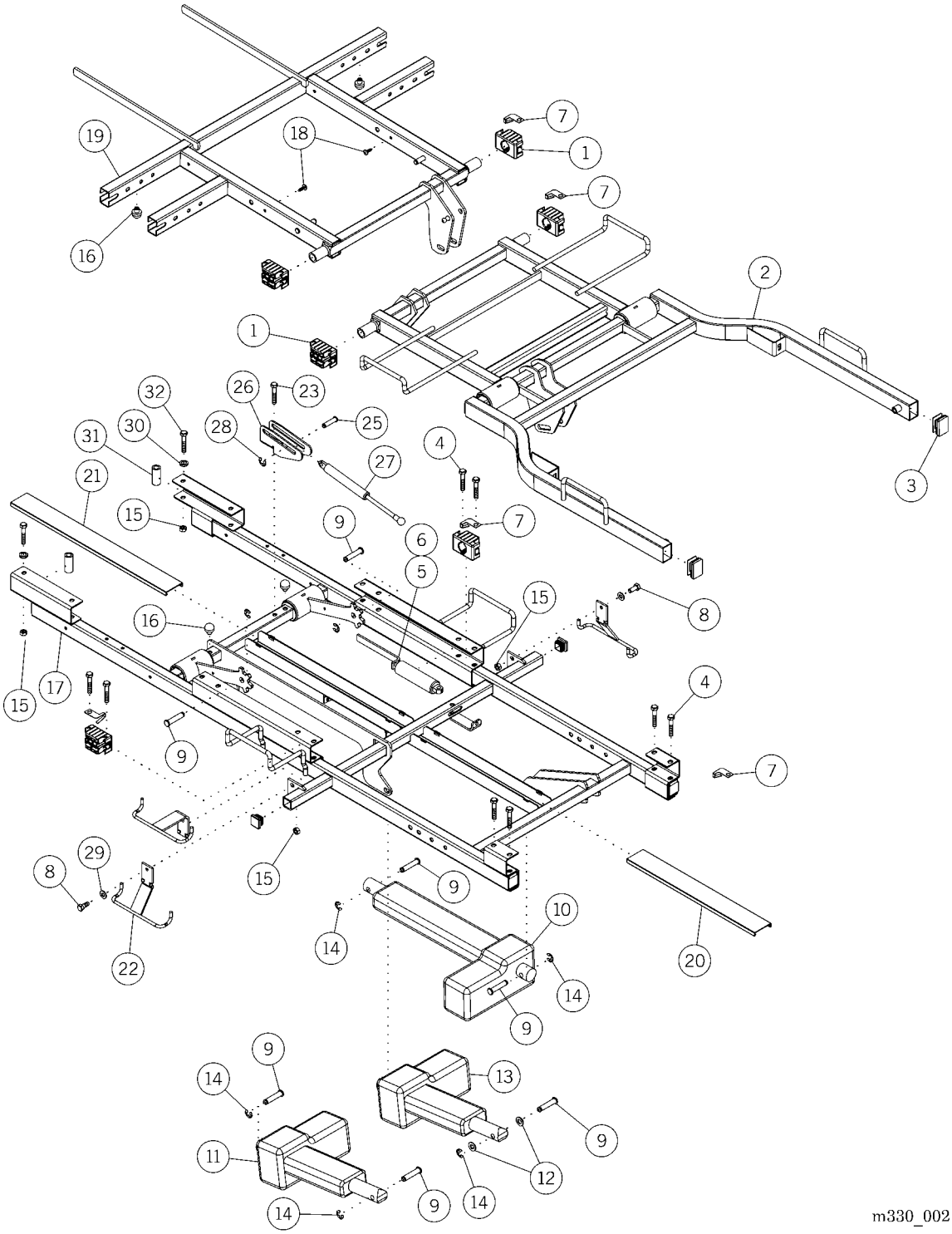


Table 5-3. Articulating Frame

Item Number	Part Number	Quantity	Description
1	S30531K (1170)	4	Bearing
2	CA0018 (1170)	1	Weldment, thigh and leg
3	QD0589 (1170)	2	End cap
4	VI0609A (1170)	8	Bolt
5	ML5327 (1170)	As required	Adhesive
6	VE0135A (1170)	2	Gas spring
7	S20992A (1170)	2	Plate, ground continuity
8	V10610A (1170)	2	Screw
9	S10959A (1170)	6	Pin, pivot
10	VE0137B (1170)	1	Motor, head section
11	VE0138C (1170)	1	Motor, thigh section
12	RM74478A (1170)	2	Washer, nylon
13	VE0139C (1170)	1	Motor, foot section
14	RM74803A (1170)	6	E-clip
15	VI0361 (1170)	4	Nut
16	QD1545A (1170)	4	Bumper
17	CA0001 (1170)	1	Weldment, intermediate frame
18	40421 (1170)	6	Mount, cable tie
19	72854 (1170)	1	Backrest weldment
20	S30555K (1170)	1	Cover, short cable tray
21	S30548K (1170)	1	Cover, long cable tray
22	71494 (1170)	2	Weldment, drainage hook
23	VI0020 (1170)	1	Screw
24	VI0361 (1170)	1	Nut
25	S11002A (1170)	1	Pivot pin, CPR
26	CA0020 (1170)	1	Bracket

Item Number	Part Number	Quantity	Description
27	72494 (1170)	1	Gas spring
28	RM74804A (1170)	1	E-clip
29	VI0616A (1170)	2	Washer, barb
30	RM74478A (1170)	2	Washer, nylon
31	VI0616A (1170)	2	Washer, barb
32	71994 (1170)	2	Spacer, head siderail
33	VI0609A (1170)	2	Screw
34	72619 (1170)	1	Bracket, CPR gas spring mount

NOTES:

Foot Extension

Figure 5-4. Foot Extension

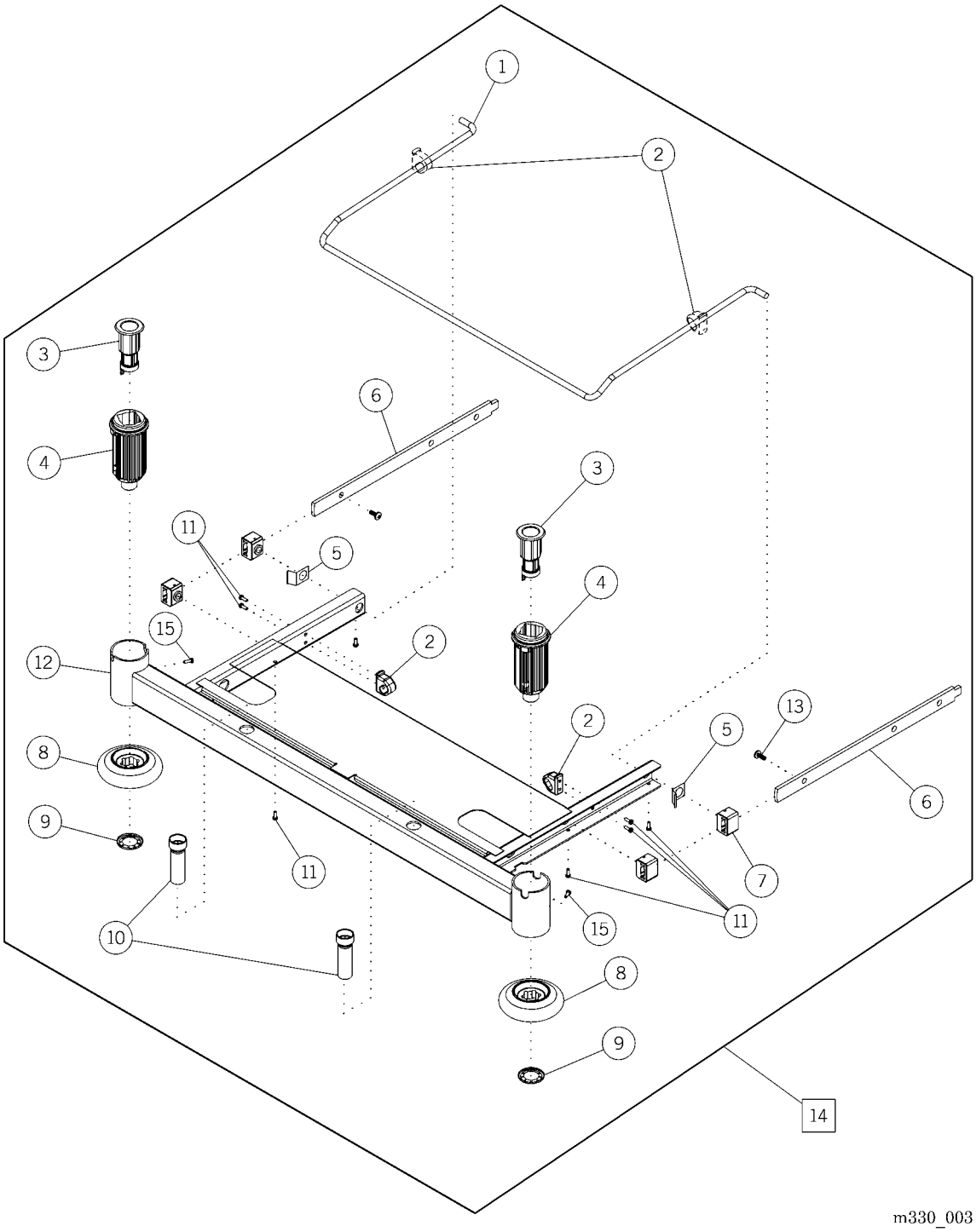


Table 5-4. Foot Extension

Item Number	Part Number	Quantity	Description
1	71266 (1170)	1	Handle, foot extension release
2	S30314 (1170)	2	Stage poignee extension
3	71438 (1170)	2	Spacer, IV pole adapter
4	S30283B (1170)	2	Accessory socket
5	S20998B (1170)	2	Blade
6	71265 (1170)	2	Bar, foot extension
7	S30315A (1170)	4	Guide, foot extend
8	71082 (1170)	2	Bumper
9	QD0663 (1170)	2	Push nut
10	S30534L (1170)	2	Foot board socket
11	VI0554A (1170)	8	Screw
12	CA0013 (1170)	1	Extension, foot weldment
13	VI0608A (1170)	2	Screw
14	CA0005 (1170)	1	Extension, foot assembly
15	VI0613A (1170)	2	Screw, plastic

Head Siderail

Figure 5-5. Head Siderail

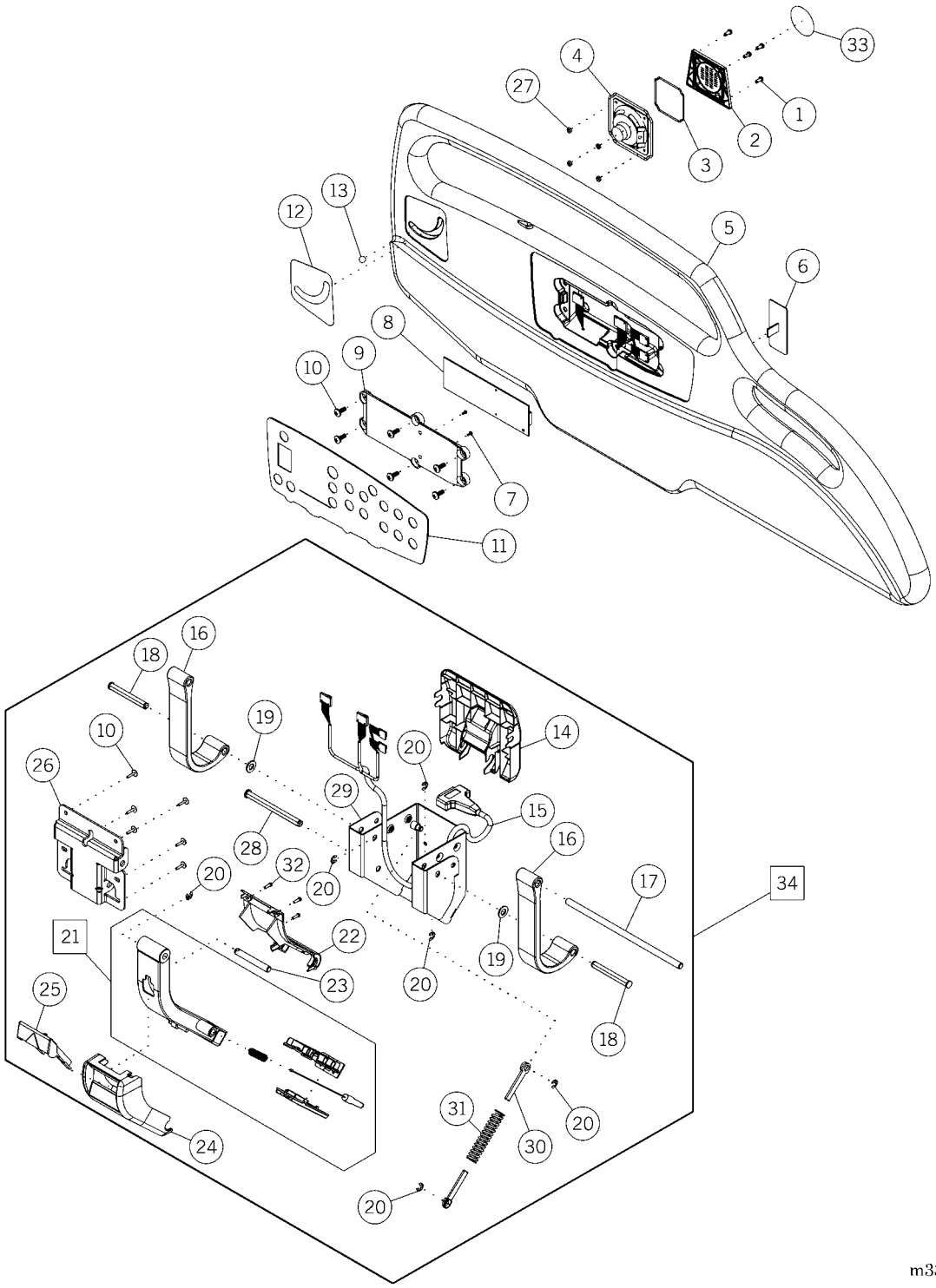


Table 5-5. Head Siderail

Item Number	Part Number	Quantity	Description
1	72862 (1170)	4 or 8	Screw with confirmer
2	71090 (1170)	1	Speaker cover
3	71091 (1170)	1	Speaker gasket
4	70746 (1170)	1	Speaker
5	71019 (1170)	1	Siderail, rh
	71062 (1170)	1	Siderail, lh
6	71536 (1170)	1	Membrane switch, nurse call
	71795 (1170)	1	Membrane switch, nurse call, blank
7	72656 (1170)	4	Standoff, P.C. board mount
8	72207 (1170)	1	Caregiver P.C. board, rh
	71514 (1170)	1	Caregiver P.C. board, lh
9	72584 (1170)	1	Support, siderail P.C. board
10	VI0601A (1170)	12 or 24	Screw with confirmer
11	71535 (1170)	1	Label, siderail control, rh, with bed exit and nurse call
	71538 (1170)	1	Label, siderail control, lh, with bed exit and nurse call
	71646 (1170)	1	Label, siderail control, rh, bed function only
	71647 (1170)	1	Label, siderail control, lh, bed function only
	71644 (1170)	1	Label, siderail control, rh, with bed exit, but no nurse call
	71645 (1170)	1	Label, siderail control, lh, with bed exit, but no nurse call
12	72820 (1170)	1	Label, angle indicator, rh
	72821 (1170)	1	Label, angle indicator, lh
13	QD1653A (1170)	1	Level ball
14	71436 (1170)	1	Cover, head
15	71372 (1170)	1	Siderail cable
16	CA0014 (1170)	2	Siderail arm, painted
17	S10951B (1170)	1	Pivot pin, outer arm, upper

Item Number	Part Number	Quantity	Description
18	S10956B (1170)	2	Pivot pin, outer, lower
19	RM74478A (1170)	2	Washer, nylon
20	RM74803A (1170)	6	E-clip
21	CA0009 (1170)	1	Siderail center arm assembly, painted
22	71087 (1170)	1	Cover, siderail center arm
23	S10952B (1170)	1	Pivot pin, center arm, upper
24	71086 (1170)	1	Enclosure, center arm
25	71085 (1170)	1	Handle, siderail
26	CA0015 (1170)	1	Siderail mount, painted
27	28562 (1170)	4	Pal nut
28	S10953B (1170)	1	Pivot pin, center arm, lower
29	CA0016 (1170)	1	Head siderail mounting bracket, painted
30	72991 (1170)	2	Spring guide
31	72791 (1170)	1	Spring, siderail dampening
32	72862 (1170)	3	Screw with confirmer
33	72290 (1170)	1	Label, blank, speaker cover
34	CA0007 (1170)	1	Siderail mount assembly, head

NOTES:

Foot Siderail

Figure 5-6. Foot Siderail

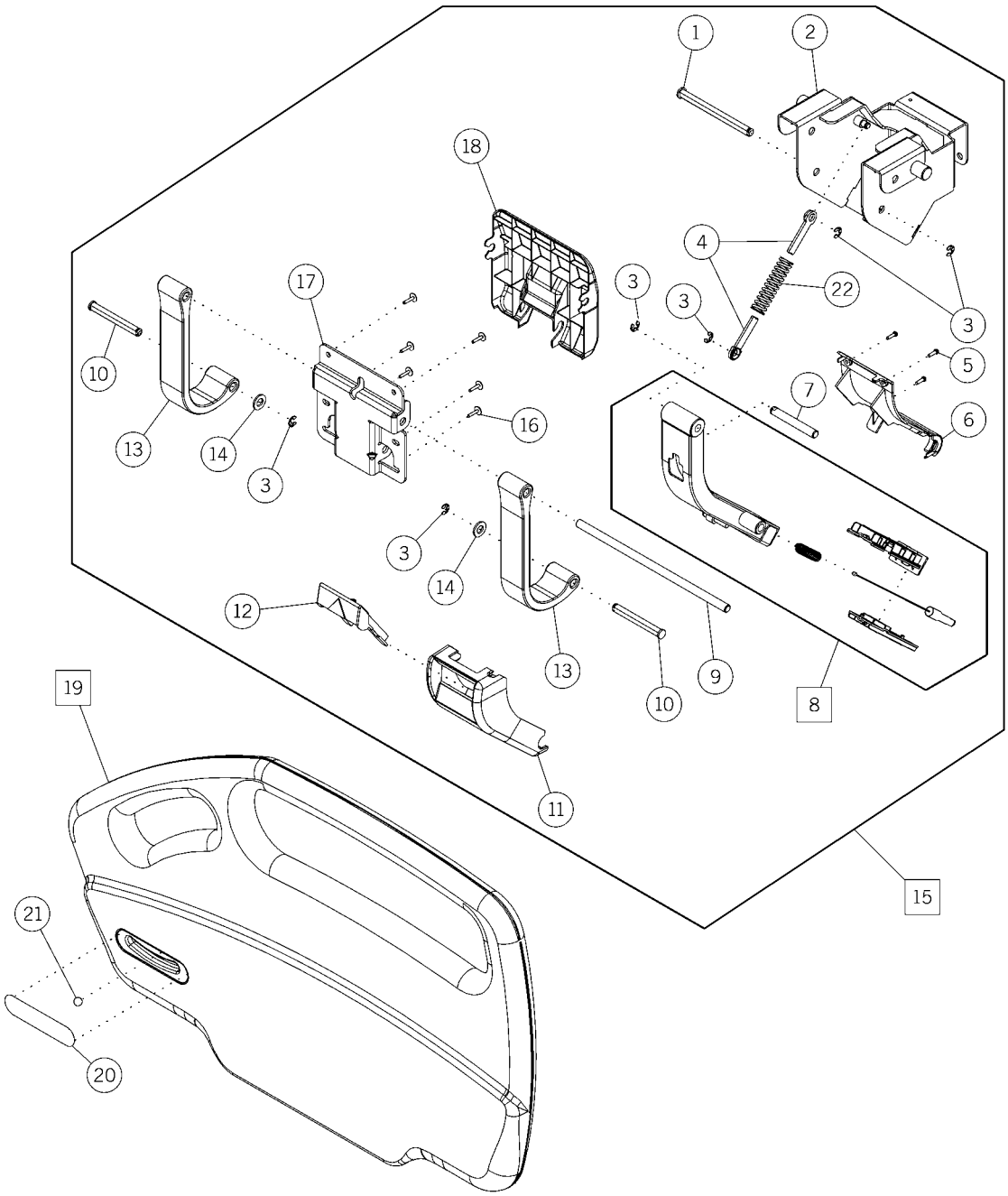


Table 5-6. Foot Siderail

Item Number	Part Number	Quantity	Description
1	S10953B (1170)	1	Pivot pin, center arm, lower
2	CA0017 (1170)	1	Foot siderail mounting bracket, painted
3	RM74803A (1170)	6	E-clip
4	72990 (1170)	2	Spring guide, assembly
5	72862 (1170)	3	Screw with confirmer
6	71087 (1170)	1	Cover, center arm
7	S10952B (1170)	1	Pivot pin, center arm, upper
8	CA0009 (1170)	1	Siderail center arm assembly, painted
9	S10951B (1170)	1	Pivot pin, outer arm, upper
10	S10956B (1170)	2	Pivot pin
11	71086 (1170)	1	Enclosure, center arm
12	71085 (1170)	1	Handle, siderail
13	CA0014 (1170)	2	Siderail arm, painted
14	RM74478A (1170)	2	Washer, nylon
15	CA0008 (1170)	1	Foot siderail mechanism
16	VI0601A (1170)	6	Screw with confirmer
17	CA0015 (1170)	1	Siderail mount, painted
18	S30542L (1170)	1	Cover
19	71018 (1170)	1	Siderail assembly, foot end, rh
	71061 (1170)	1	Siderail assembly, foot end, lh
20	71656 (1170)	1	Label
21	QD1653A (1170)	1	Level ball
22	72792 (1170)	1	Spring, siderail, foot

Footboard and Headboard

Figure 5-7. Footboard and Headboard

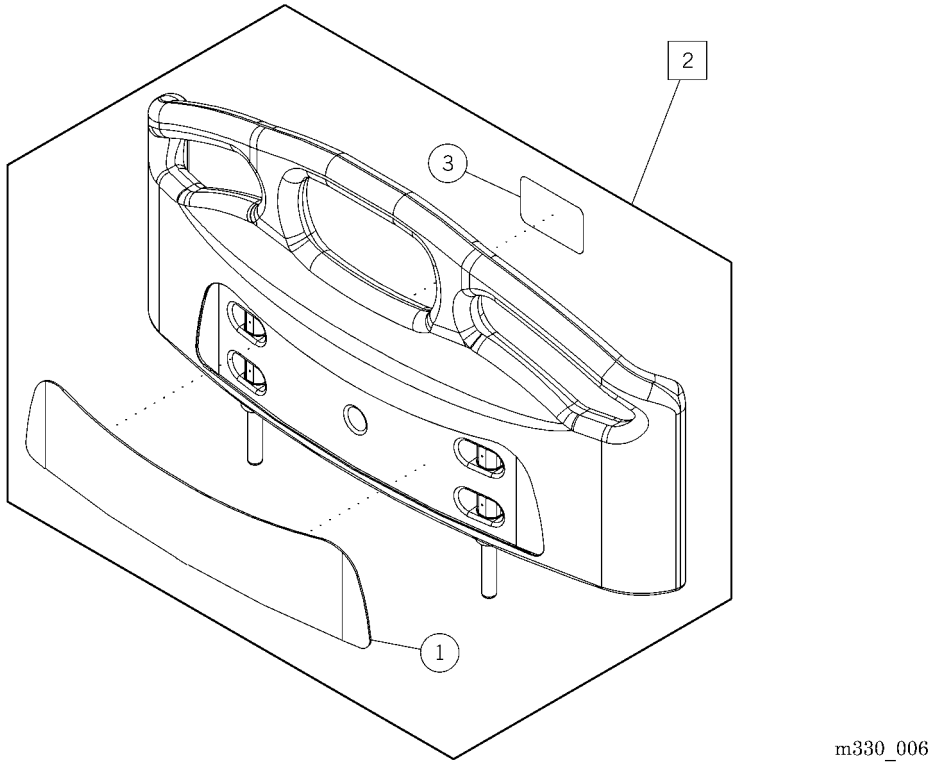


Table 5-7. Footboard and Headboard

Item Number	Part Number	Quantity	Description
1	71650 (1170)	1	Label
2	CA0004 (1170)	1	Footboard or headboard assembly
3	71549 (1170)	1	CPR label

Plastic Sleep Deck

Figure 5-8. Plastic Sleep Deck

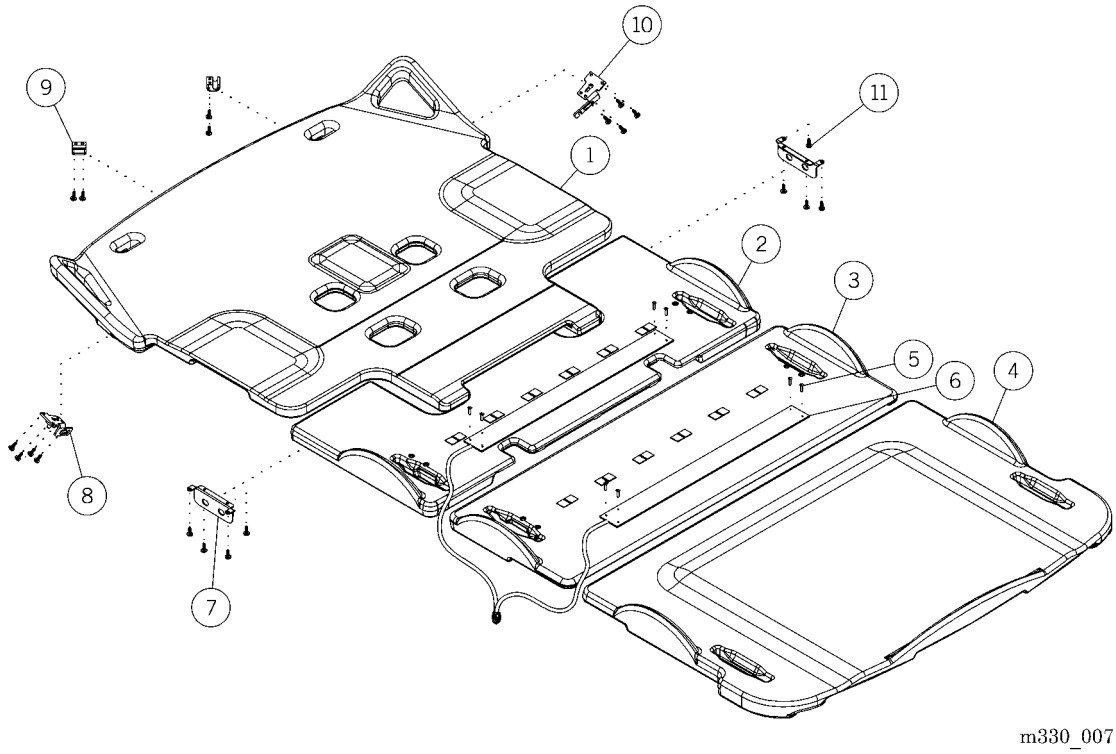


Table 5-8. Plastic Sleep Deck

Item Number	Part Number	Quantity	Description
1	71038 (1170)	1	Sleep surface panel, backrest
2	71037 (1170)	1	Sleep surface panel, seat
3	71036 (1170)	1	Sleep surface panel, knee
4	71035 (1170)	1	Sleep surface panel, foot
5	71515 (1170)	8	Rivet, plastic
6	34400 (1170)	2	Tape strip, bed exit
7	71525 (1170)	2	Bracket
8	71526 (1170)	1	Weldment, CPR bracket and spacer, rh
9	S30398 (1170)	2	Cable guide
10	71527 (1170)	1	Weldment, CPR bracket and spacer, lh
11	VI0615A (1170)	20	Screw

Motor Control Box

Figure 5-9. Motor Control Box

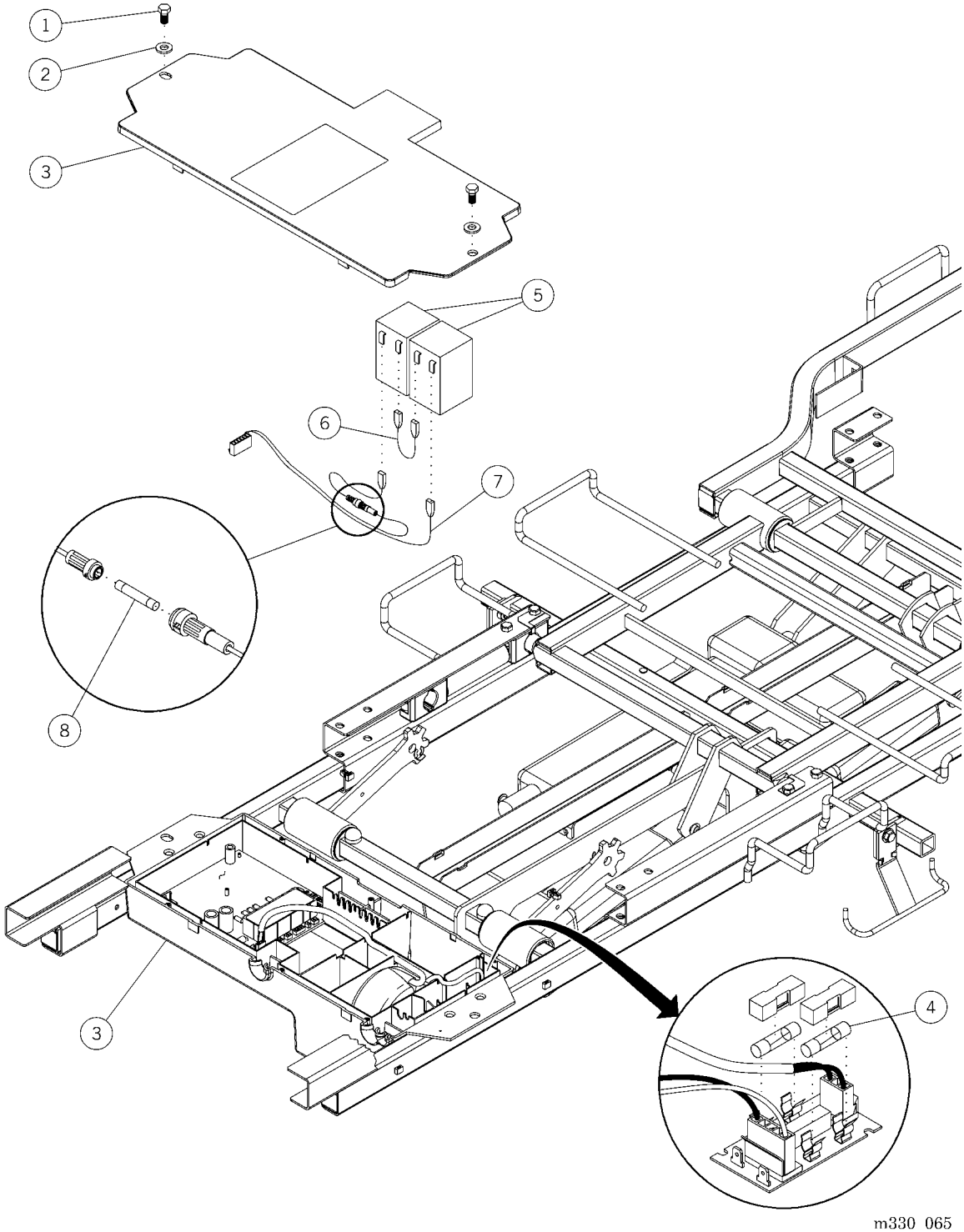


Table 5-9. Motor Control Box

Item Number	Part Number	Quantity	Description
1	VI0608A (1170)	2	Screw
2	VI0616A (1170)	2	Washer
3	71460 (1170)	1	Control box assembly (does not contain batteries)
4	128593 (1170)	2	Fuse, AC
5	QD1642A (1170)	2	Battery
6	QD1755A (1170)	1	Cable assembly
7	QD1873A (1170)	1	Cable assembly
8	128594 (1170)	1	Fuse, battery
9	128595 (1170)	1	Fuse, SideCom® Communication System

CPR Cables

Figure 5-10. CPR Cables

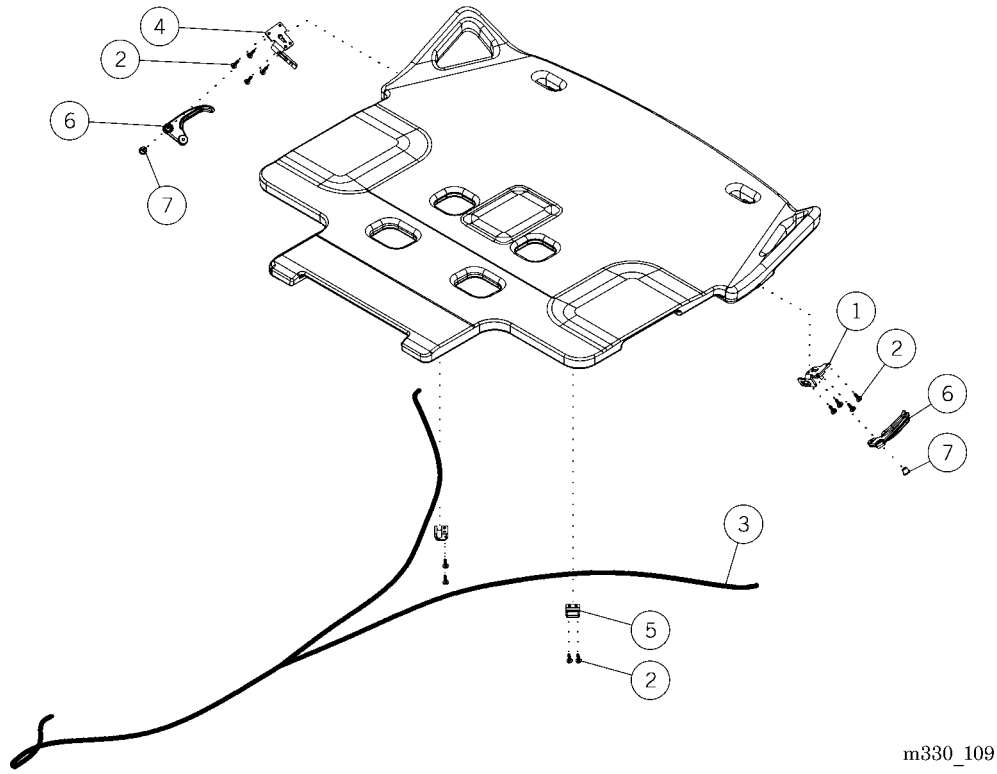


Table 5-10. CPR Cables

Item Number	Part Number	Quantity	Description
1	71527 (1170)	1	Weldment, CPR bracket and spacer, lh
2	VI0615A (1170)	12	Screw
3	71520 (1170)	1	CPR cable
4	71526 (1170)	1	Weldment, CPR bracket and spacer, rh
5	530398 (1170)	2	Cable guide
6	71660 (1170)	2	Handle, CPR, red
7	510499 (1170)	2	Nut, CPR handle

NOTES:

Control Cables

Figure 5-11. Control Cables

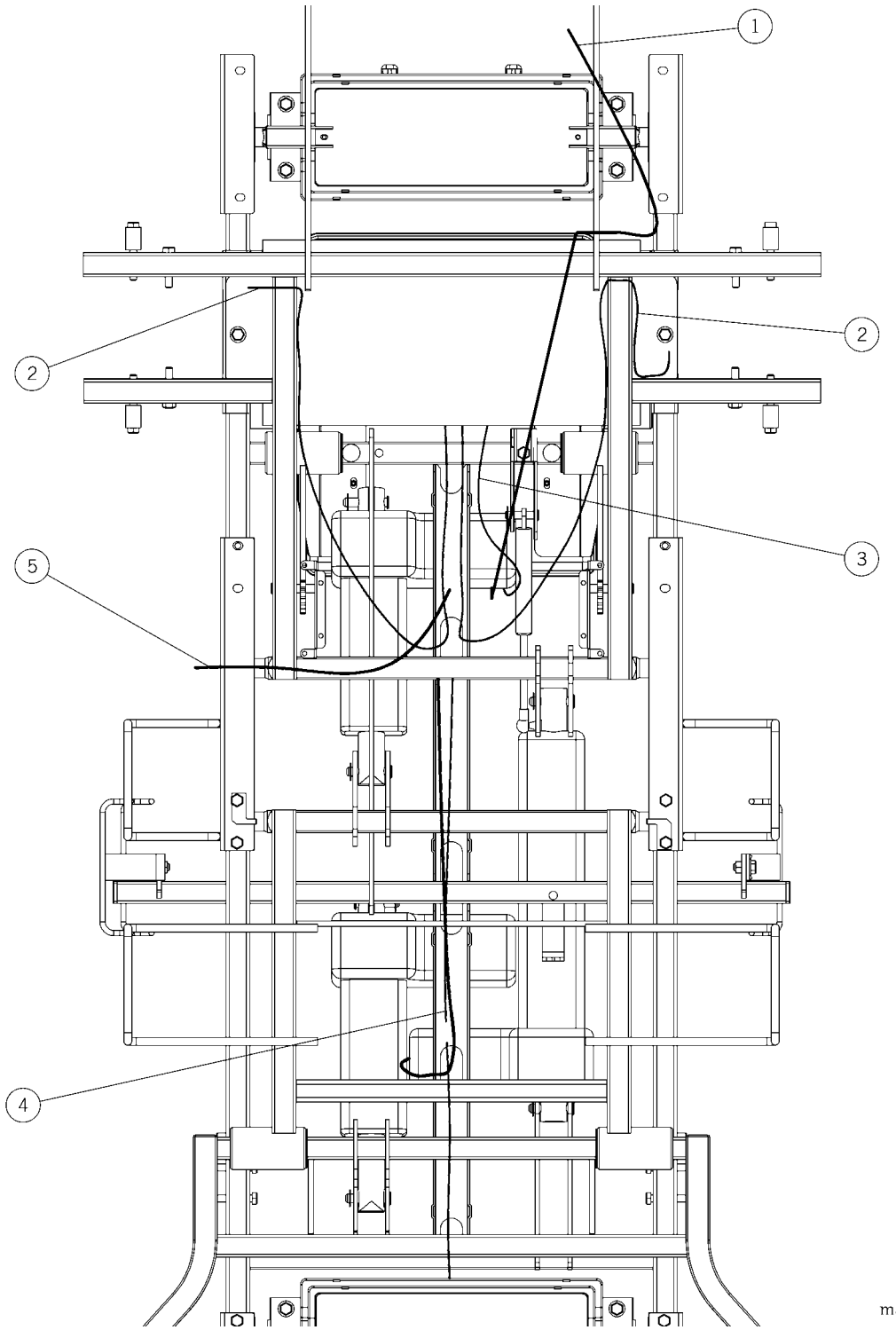


Table 5-11. Control Cables

Item Number	Part Number	Quantity	Description
1	71459 (1170)	1	SideCom® Communication System cable
2	71372 (1170)	1 (per side)	Siderail cable
3	71762 (1170)	1	Interface P.C. board cable
4	QD1678G (1170)	1	Foot hilow column extension cable
5	71761 (1170)	1	Pendant cable
6 (not shown)	71073 (1170)	1	Pendant, without SideCom® Communication System
7 (not shown)	72781 (1170)	1	Pendant, with SideCom® Communication System

Interface Control Box

Figure 5-12. Interface Control Box

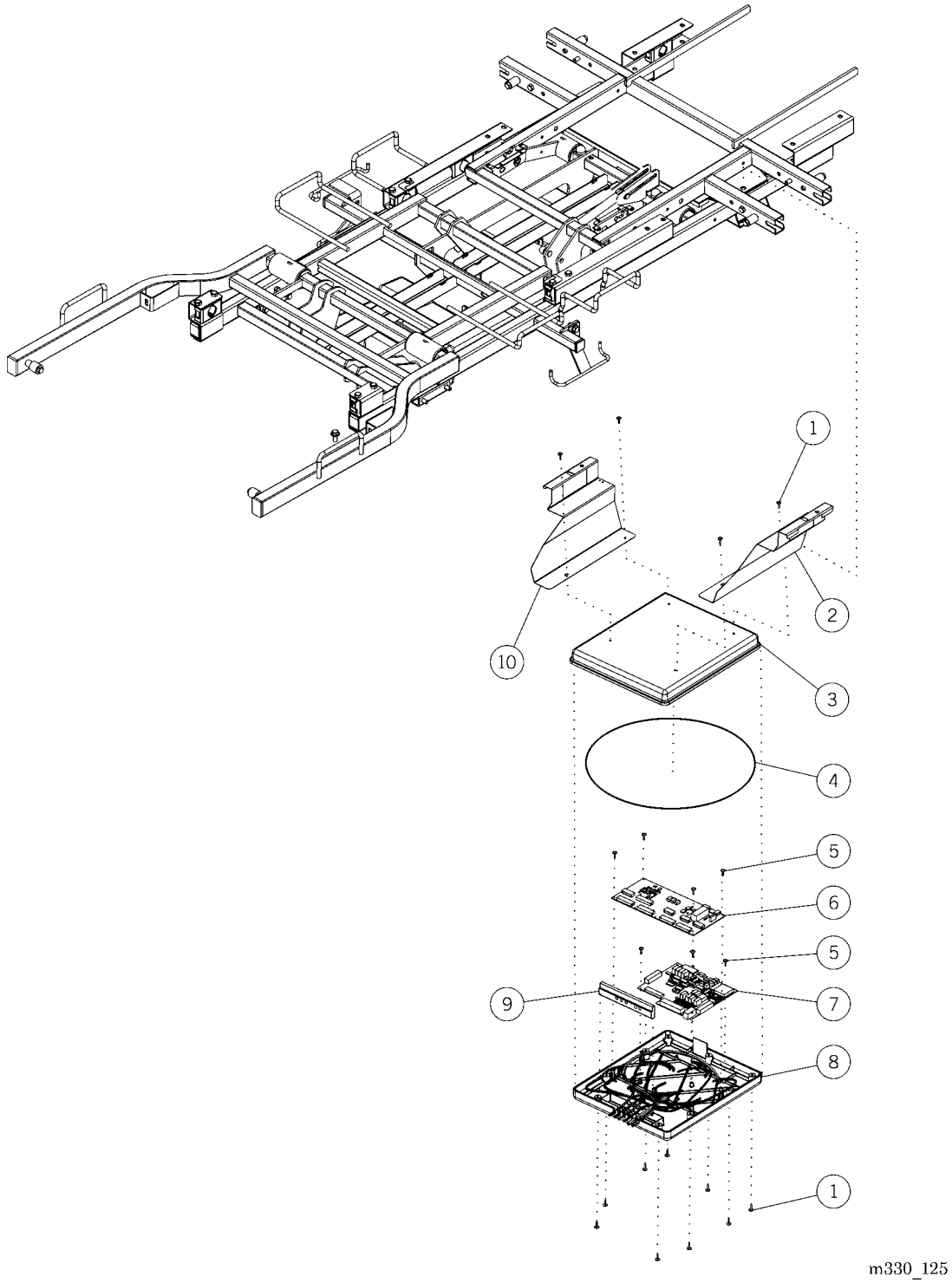


Table 5-12. Interface Control Box

Item Number	Part Number	Quantity	Description
1	VI0601A (1170)	13	Screw with confirmer
2	CA0021 (1170)	1	Bracket, lh, painted
3	71441 (1170)	1	Lid, junction box
4	71792 (1170)	1	Seal, neoprene cord
5	VI0426 (1170)	3	Screw, plastic
6	71434 (1170)	1	P.C. board, siderail interface
7	71667 (1170)	1	P.C. board assembly, SideCom® Communication System (universal television (UTV) junction)
	71793 (1170)	1	SideCom® Communication System P.C. board (five-wire)
	71791 (1170)	1	SideCom® Communication System P.C. board (wired radio)
8	71440 (1170)	1	Junction box
9	71704 (1170)	1	Vertical seal, base bed
	71705 (1170)	1	Vertical seal, communication
	71552 (1170)	1	Vertical seal, SideCom® Communication System models
10	CA0022 (1170)	1	Bracket, rh, painted

NOTES:

Chapter 6
General Procedures

Cleaning and Care

WARNING:
Follow the product manufacturer's instructions. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

CAUTION:
Do not use harsh cleaners, solvents, or detergents. Equipment damage could occur.

General Cleaning

Clean the unit with a lightly dampened cloth and ordinary disinfectants. Do not use excessive liquid.

Steam Cleaning

Do not use any steam cleaning device on the CareAssist™ Bed. Excessive moisture can damage mechanisms in this unit.

Cleaning Hard to Clean Spots

To remove difficult spots or stains, use standard household cleaners and a soft bristle brush. To loosen heavy, dried-on soil or excreta, you may first need to saturate the spot.

Disinfecting

When there is visible soilage and between patients, we recommend that you disinfect the unit with a tuberculocidal disinfectant. (For customers in the US, the disinfectant should be registered with the Environmental Protection Agency.)

Dilute disinfectants and germicides as specified on the manufacturer's label.

Do not spray the disinfectant onto power cord terminals or bed control switches.

Component Handling

CAUTION:
To help prevent component damage, make sure your hands are clean, and **only** handle the P.C. board by its edges.

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

CAUTION:
For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

P.C. Board

When servicing the P.C. board, follow good handling practices. Mishandling a P.C. board can cause the following:

- P.C. board damage
- Shortened P.C. board life
- Unit malfunctions

Observe the following P.C. board handling rules:

- Make sure your hands are clean and free of moisture, oily liquids, etc.
- **Only** handle the P.C. board by its outer edges.
- Do not touch the P.C. board components. Finger contact with the board surface and/or with its components can leave a deposit that will result in board (and component) deterioration.
- When working with electronics, wear an appropriate antistatic strap, and make sure it is properly grounded.
- Service the removed P.C. board at a static-free workstation that is properly grounded.
- For shipping and storage, place the removed P.C. board in an antistatic protective bag.

Lubrication Requirements

There are no lubrication requirements for the CareAssist™ Bed.

Preventive Maintenance

WARNING:
Only the facility-authorized personnel should service the CareAssist™ Bed. Servicing performed by unauthorized personnel could result in personal injury or equipment damage.

The CareAssist™ Bed should be subject to an efficient maintenance programme. This will ensure the long life and productivity of the CareAssist™ Bed and help to reduce downtime due to excessive wear failures.

An annual service of the bed is advised in order to maintain its characteristics and performance.

Every 3 years, the batteries should be replaced by a facility-authorized maintenance personnel.

Every 5 years, the bed exit tape switches should be replaced by a facility-authorized maintenance personnel.

Preventive Maintenance Schedule

Table 6-1. Preventive Maintenance Schedule

Function	Procedure
Overall condition, frame and welded assemblies	Check the overall condition of the bed. Check that the structure and welded assemblies are in good working condition and that there are no impacts or corrosion. Do any necessary repairs or paint retouches, replace parts if necessary. Observe the symmetry of the bed and check that the bed frame and base are not twisted. Do any necessary repairs or paint retouches. Check that all labels are installed and can be read, replace them if necessary.
Headboard and footboard	Check the appearance, attachment and safety of the headboard and footboard. Replace if necessary.
AC power cable	Check that there are no cuts, scrapes, or breaks in the AC power cable or connector. Replace the AC power cable if necessary.
Leakage current	Unplug the bed from its power source. Connect the bed to the safety tester and connect this device to the power outlet. Check that the bed is correctly supplied by the test device: control unit LEDs lit (unlock the functions if necessary). Measure the leakage current measures without operating any function. The value must be less than 100 µA. Check the AC power cable and power supply unit if the value is outside of the specifications. Replace the AC power cable or power supply unit if necessary.
Patient pendant	Disconnect the patient pendant and check the condition of the connector. Then reconnect or replace the pendant. Test each of the buttons to check that they activate the correct function and that they do not work intermittently by pressing each button for several seconds. Each movement must be continuous. Replace the pendant if necessary.

Function	Procedure
Hilow columns	Inspect the column assembly for the presence and tightness of the attachment screws and the snap ring at the bottom of the column. Repair as necessary. Fully raise and lower the bed frame one time. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Make sure the Bed Not Down position indicator illuminates on the control pendant and goes out when the bed is in the low position. Replace the defective column(s) in the event of a malfunction. Troubleshoot in the event of a doubt.
Head section motor	Inspect the actuator assembly. Make sure the pins and retaining clips are intact and not missing. Fully raise and lower the head section. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Repair as necessary.
Plastic sleep deck	Fully raise and lower the head section. Check for binding during the head section movement. Make sure the hard surface and its drive system are in good condition. Make sure there is no friction or abnormal noises. Replace any damaged parts. Remove each hard surface (except the head section) and check its condition. Replace if necessary.

Function	Procedure
CPR release	Inspect the handles, cables and CPR mechanism on the head motor. Make sure the screws are present and fully tightened. Make sure the two CPR release handles, cable and CPR mechanism on the head motor are in good condition. Raise the head section to the high position, then activate one of the CPR releases. Make sure t the head section lowers. Adjust the CPR cable as necessary. Do the same tests on the other side of the bed. Release the CPR handles and make sure the mechanism locks correctly by operating the *Head Up* control for a few seconds. The elevation movement must be observed. Replace the head section motor as necessary.
Head section gas springs	Inspect the assembly of the gas springs. Check that the screws are present and fully tightened. Make sure there is no oil on its shaft. Fully raise the head section. Activate the CPR function. Make sure the head section lowers rapidly to the intermediate position then gradually to the low position. Replace as necessary.
Knee section motor	Inspect the knee section motor. Make sure the pins and retaining clips are not missing. Fully raise and lower knee section. make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace as necessary.
Automatic Contour	Make sure the knee section rises up to mid-height when the head section is raised from the low position, and that it lowers automatically when the head section lowers and the head section reaches the low position. Replace the actuator or defective unit if necessary.

Function	Procedure
Foot section motor	Raise the knee section to the mid-height position. Inspect the foot actuator. Make sure the pins and retaining rings are present. Fully raise and the foot section. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace as necessary.
Dining Chair™ Position	Make sure the Chair, head section, thigh section and foot section functions are not locked out. Activate the chair function and make sure the three sections to the required position. Return the sleep deck to the flat position. Troubleshoot as required.
Trendelenburg/ Reverse Trendelenburg	Activate the *Trendelenburg* function. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Activate the *Reverse Trendelenburg* function. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace as necessary.
Battery	Make sure that the bed is unplugged from its power source. Operate all the functions using the caregiver controls. Charge the batteries or replace them if necessary. Check the date indicated on the batteries, replace the battery if the date is over three years.

Function	Procedure
Siderails	Make sure the head and foot siderails are not bent or twisted. Make sure the latch mechanism operates correctly. An audible click must be heard. Remove the siderail cover, and make sure the mounting screws are tight. Inspect the cable routing for pinching, binding, and damage. Make sure all functions on the caregiver control operate correctly. Repair or replace the siderail as necessary.
Foot extension	Operate the foot extension to make sure the movement is correct and that it locks properly into the different positions when the lever is released. Repair or replace the foot extension as required.
Pivot points	Make sure the articulations of the bed operate without making any noise (high low column bearings, head and thigh sections). Lubricate as necessary.
Casters	Check for cuts, wear and quality of the tread, etc. Replace if necessary.
Braking and steering	Check the brakes to see whether the bed moves when the brake bar is pressed. Repair as necessary. Make sure the steering mechanism. Replace or adjust the steering control elements of the steering caster if necessary. Replace the caster if necessary. Plug the bed into an appropriate power source and set the brake bar to neutral. Make sure the alarm is heard. Set the brakes on the bed. make sure the alarm stops sounding.
Accessories	Check the proper operation of any accessories installed on the bed. Replace any missing or damaged parts.
SideCom® Communication System	Inspect and test the communication junction box. Make sure the SideCom® Communication System features operate correctly. Inspect the communication cable, including the male and female pins in the plug. Replace as necessary.

Preventive Maintenance Checklist

Table 6-2. Preventive Maintenance Checklist

Date																					**Functions**
Hill-Rom	**Manufacturer**																				Overall condition
																					Head and footboards
																					AC power cord
																					Leakage current
																					Patient pendant
																					Hilow columns
																					Head section motor
																					Plastic sleep deck
	Model Number																				CPR release
																					Head section gas spring
																					Knee section motor
																					Automatic contour
																					Foot section motor
																					Dining Chair™ Position
																					Trendelenburg/Reverse
																					Trendelenburg
	Serial Number																				Battery
																					Siderails
																					Foot extension
																					Pivot points
																					Casters
																					Braking and steering
																					Accessories
																					SideCom®
																					Communication System
Total Cost for this Page																					**Labor Time:**
																					Repair Cost:
																					Inspected by:
																					Legend L=Lube C=Clean A=Adjust R=Repair or Replace O=Okay N=Not Applicable Remarks:

Chapter 7
Accessories

Accessories

For CareAssist™ Bed accessories, see table 7-1 on page 7-1.

Table 7-1. Accessories List

Product Number	Description
P158	Infusion Support System
P276	Oxygen Tank Holder
P2217	Standard IV Pole
P734EA1	Mattress Pad Extender
P731EA3	Mattress
P163	Adapter Bracket

7.1 Infusion Support System—P158

Tools required: None

The Infusion Support System (ISS) consists of a movable and adjustable IV rod that attaches to the head end of the system. The pole supports IV pumps or bags in a vertical orientation and raises or lowers the pumps or bags with respect to the bed frame.

Each Infusion Support System can support one infusion pump plus two liters of intravenous solution.

Installation

WARNING:
Do not exceed ISS pole weight capacity. Personal injury or equipment damage could occur.

WARNING:
When lowering the upper section of an ISS pole, always grasp and hold the upper section of the pole before twisting the release knob. Failure to do so could result in personal injury or equipment damage.

1. Install the P163 adapter into any of the four equipment sockets.
2. Install the ISS pole into the adapter.
3. Hang up to 40 lb (18 kg) on the ISS pole.

CAUTION:
Do not mount infusion pumps on the lower section of an IV rod. Interference with head section articulation could result.

4. Hang pumps on the upper section of an ISS pole.

7.2 Oxygen Tank Holder—P27601

Tools required: None

The oxygen tank holder attaches to the bed in a vertical position. The Oxygen Tank Holder accommodates one E-size oxygen tank with a regulator. The mounting points are located at each corner of the bed and permit the affixed oxygen tank holders to pivot.

WARNING:
If the oxygen tank holder is placed at the foot end of the bed, make sure the Knee Up/Down controls are locked out. Failure to do so can result in caregiver, patient, or visitor injury if the foot section fully lowers and the holder becomes dislodged from the bed.

Installation

1. Install the mounting bar vertically into an equipment socket at any corner of the bed.
2. Place one E-size oxygen tank in the holder.
3. Tighten the holder thumbscrew.

NOTE:
The thumbscrew keeps the oxygen tank from rotating in the holder.

Removal

1. Loosen the thumbscrew that holds the tank securely in the holder.
2. Lift the tank out of the holder.
3. Lift up on the tank holder, and remove it from the equipment socket.

7.3 Standard IV Pole—P2217

Tools required: None

The IV pole is a removable, telescopic pole that installs at any of the four corners of the system in the holes provided.

WARNING:
Do not exceed IV rod weight capacity, personal injury or equipment damage could result.

WARNING:
When lowering the upper section of an IV rod, always grasp and hold the upper section of the pole before pulling the release knob. Failure to do so could result in personal injury or equipment damage.

Installation

Install the IV rod in an equipment socket at any corner of the bed.

Removal

Reverse the installation procedure to remove the IV Rod.

7.4 Mattress Pad Extender—P734EA1

Tools required: None

Installation

1. Extend the foot section (A) (see figure 7-1 on page 7-5).

Figure 7-1. Mattress Pad Extender

m330_121

2. Insert the extender between the footboard and mattress.

Removal

Reverse the installation procedure to remove mattress pad extender.

7.5 Mattress—P731EA3

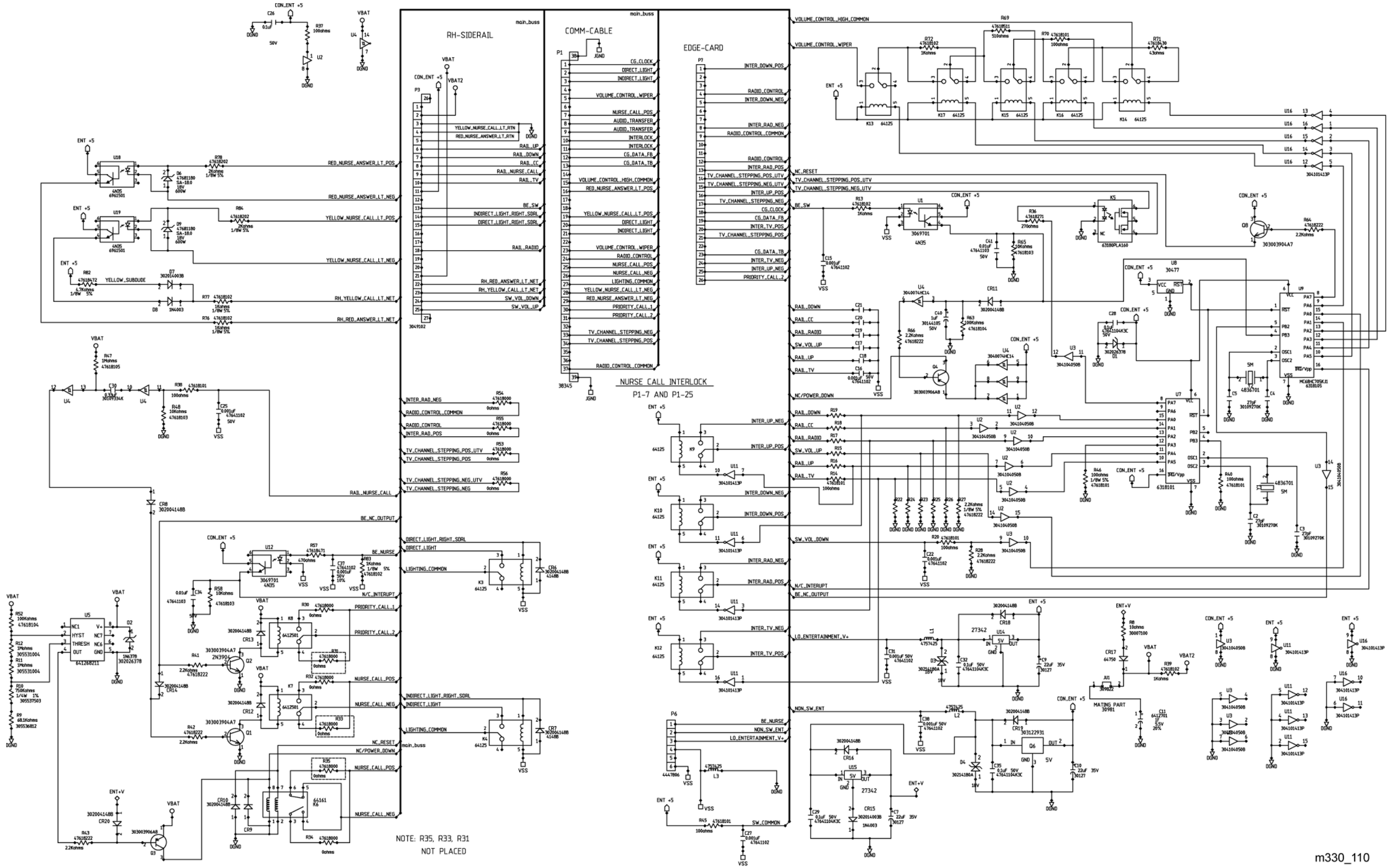
Tools required: None

Installation

1. Lower all four siderails.
2. Set the mattress on the sleep deck.

Removal

Reverse the installation procedure to remove the mattress.



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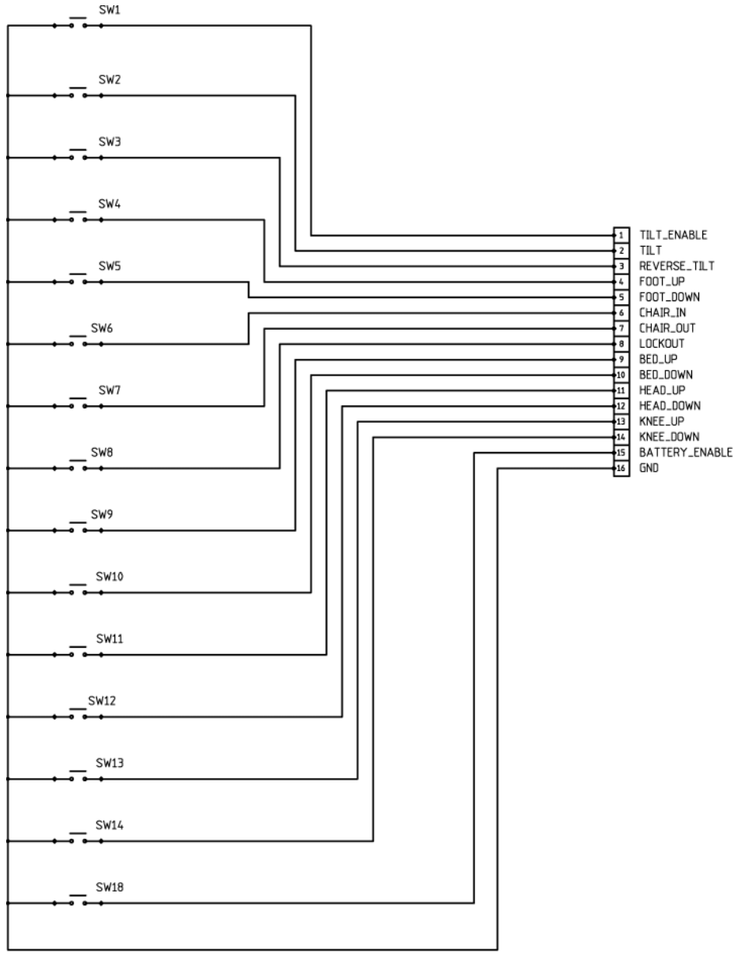
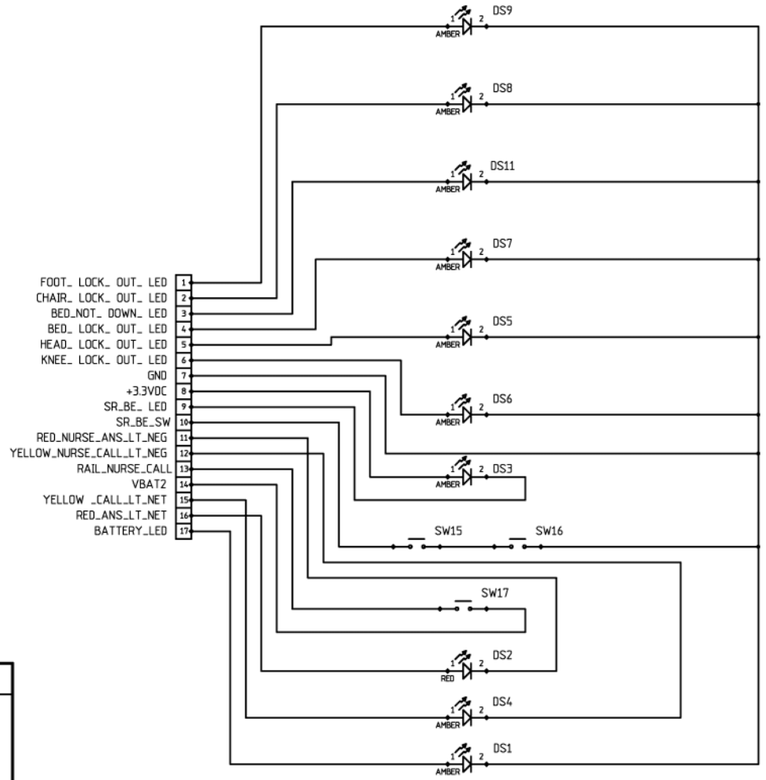
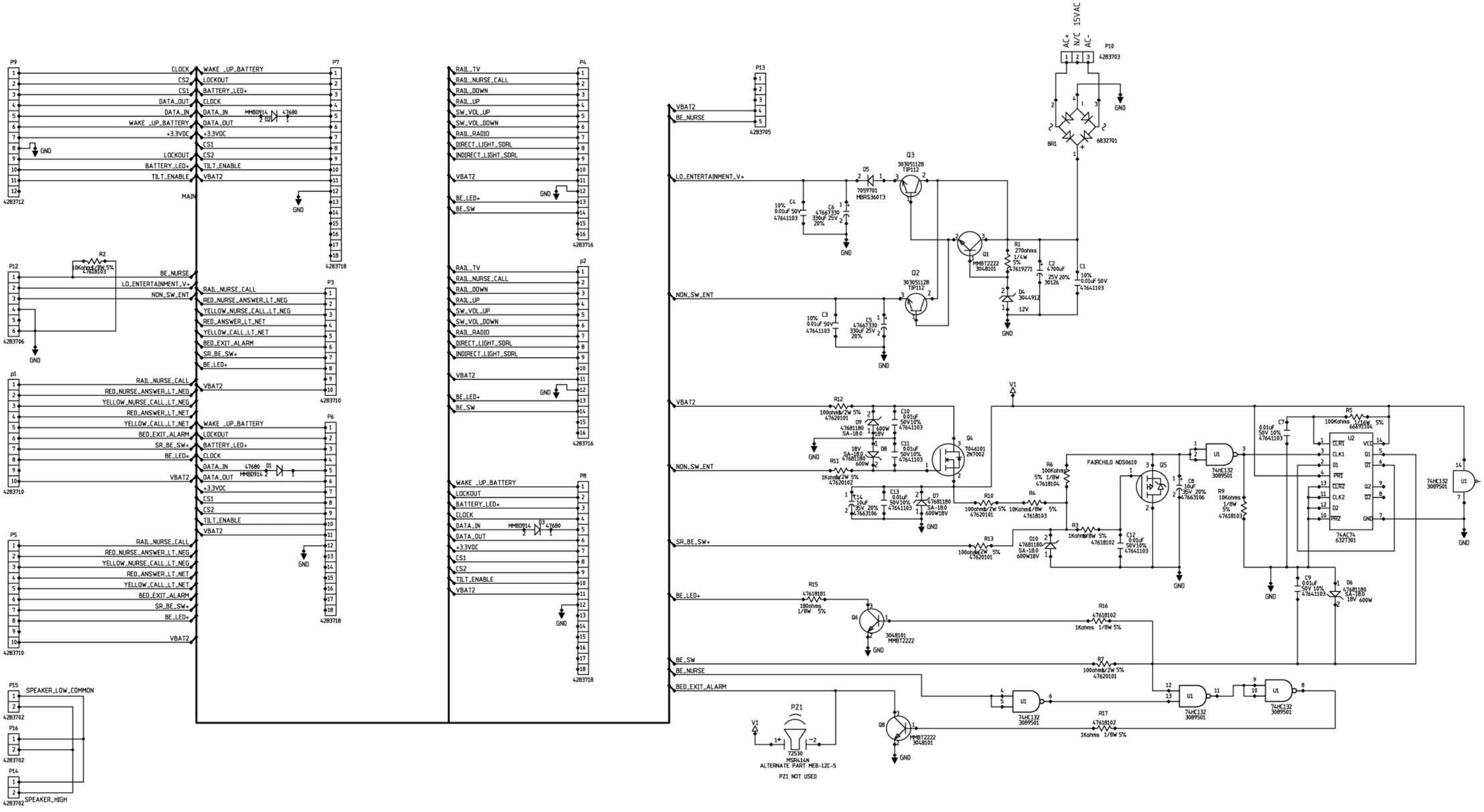
FO 3-1





SWITCH NUMBER	SWITCH FUNCTION
SW1	TILT_ENABLE
SW2	TILT
SW3	REVERSE_TILT
SW4	FOOT_UP
SW5	FOOT_DOWN
SW6	CHAIR_IN
SW7	CHAIR_OUT
SW8	LOCKOUT
SW9	BED_UP
SW10	BED_DOWN
SW11	HEAD_UP
SW12	HEAD_DOWN
SW13	KNEE_UP
SW14	KNEE_DOWN
SW15 & SW16	SR_BE_SW
SW17	RAIL_NURSE_CALL
	VBAT2
SW18	BATTERY_ENABLE

LED	COLOR	FUNCTION
DS1	AMBER	BATTERY LED+
DS2	AMBER	NURSE CALL
DS3	AMBER	BED_EXIT
DS4	RED	NURSE ANSWER
DS5	AMBER	HEAD LOCK OUT
DS6	AMBER	KNEE LOCK OUT
DS7	AMBER	BED LOCK OUT
DS8	AMBER	CHAIR LOCK OUT
DS9	AMBER	FOOT LOCK OUT
DS11	AMBER	BED NOT DOWN



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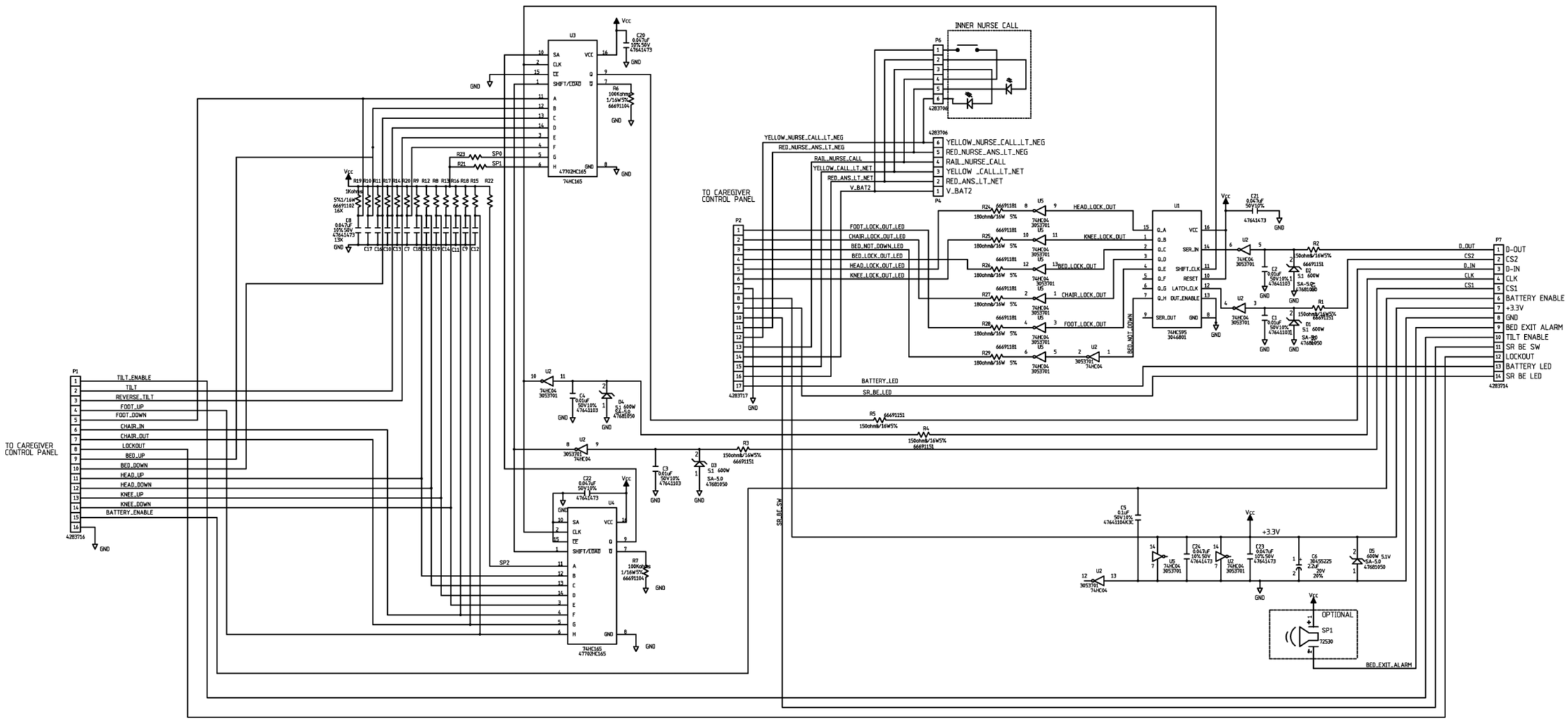
FO 3-3

Left Caregiver Signal Conditioning



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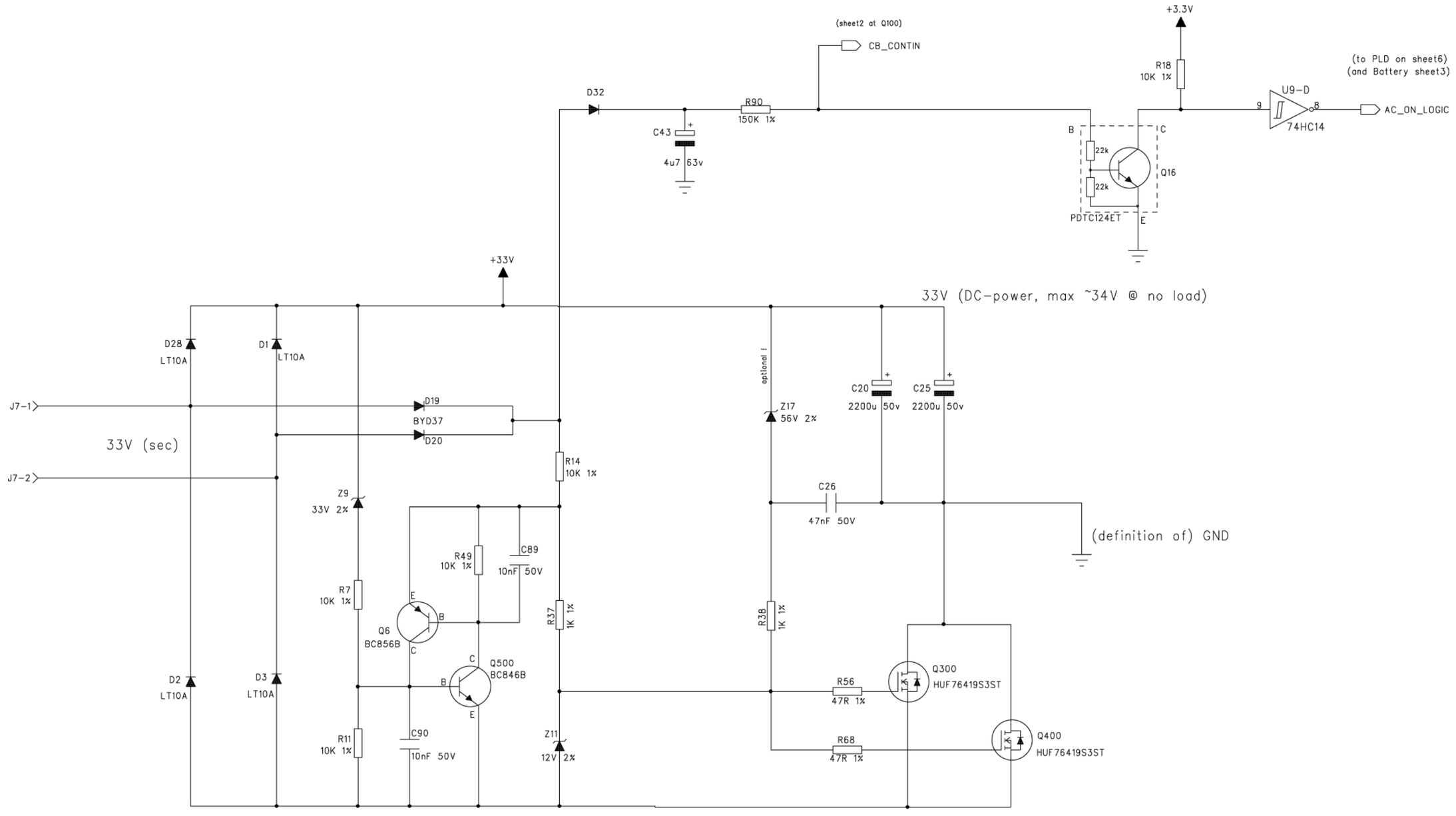
FO 3-4

Bed Control Board Power and Phase Control



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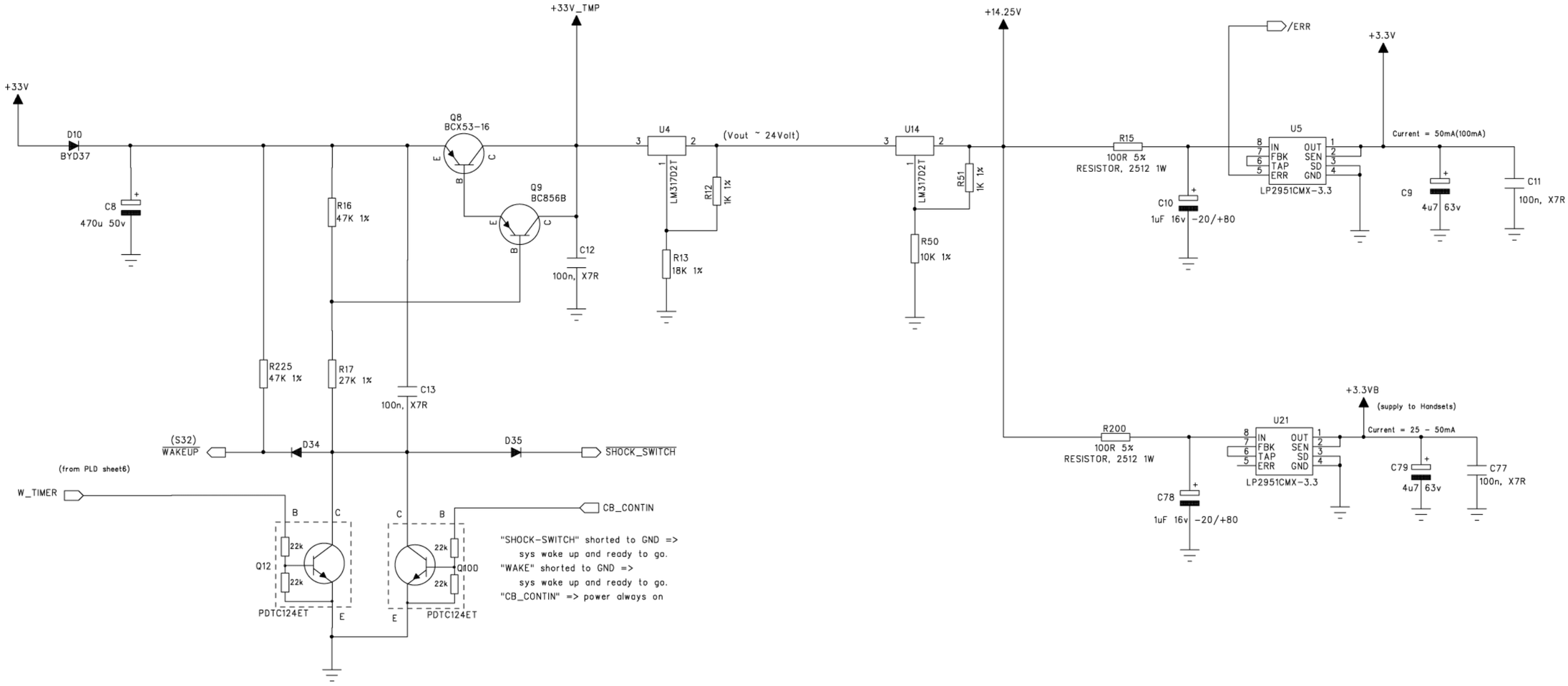
FO 3-5

Bed Control Board Power Management



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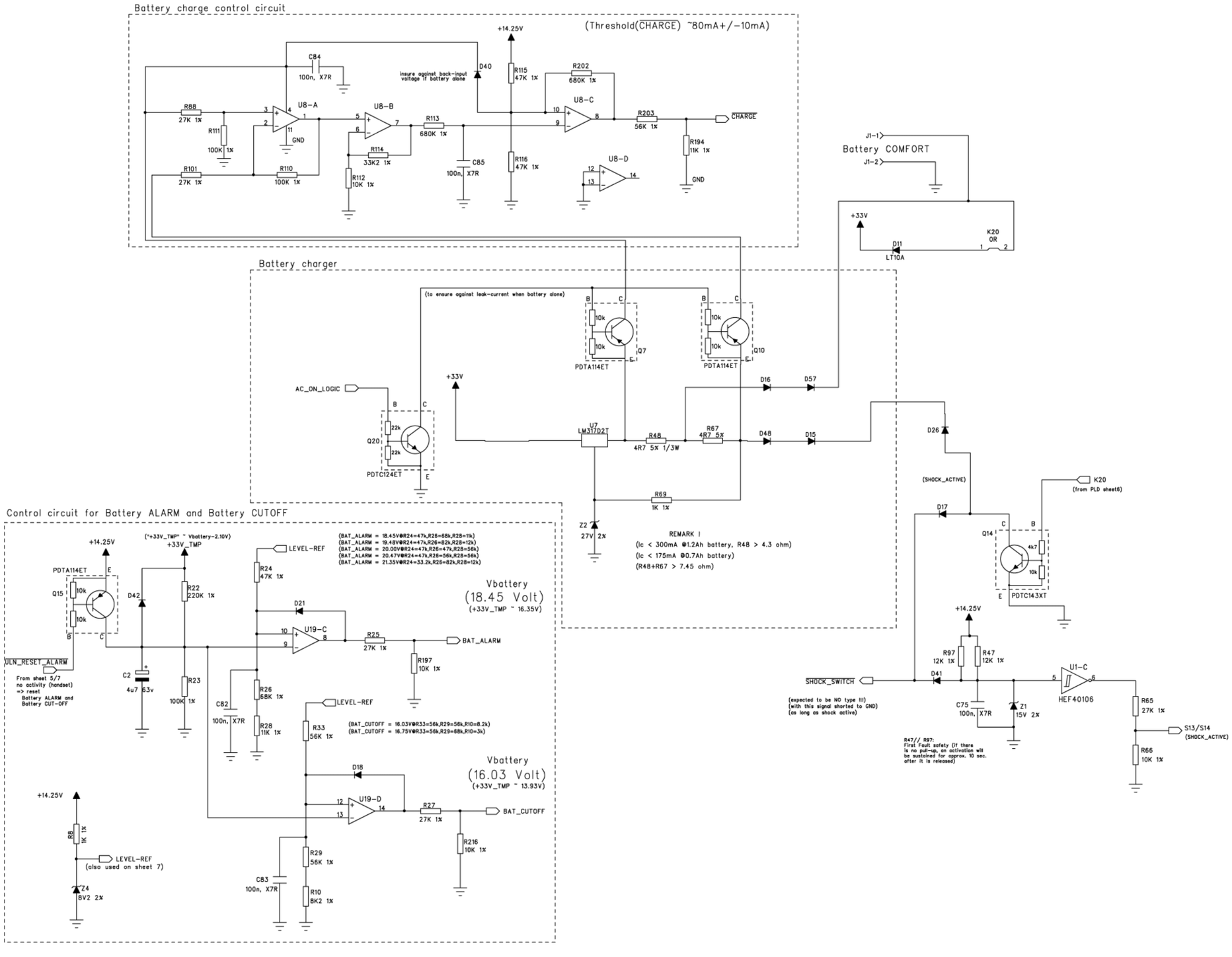
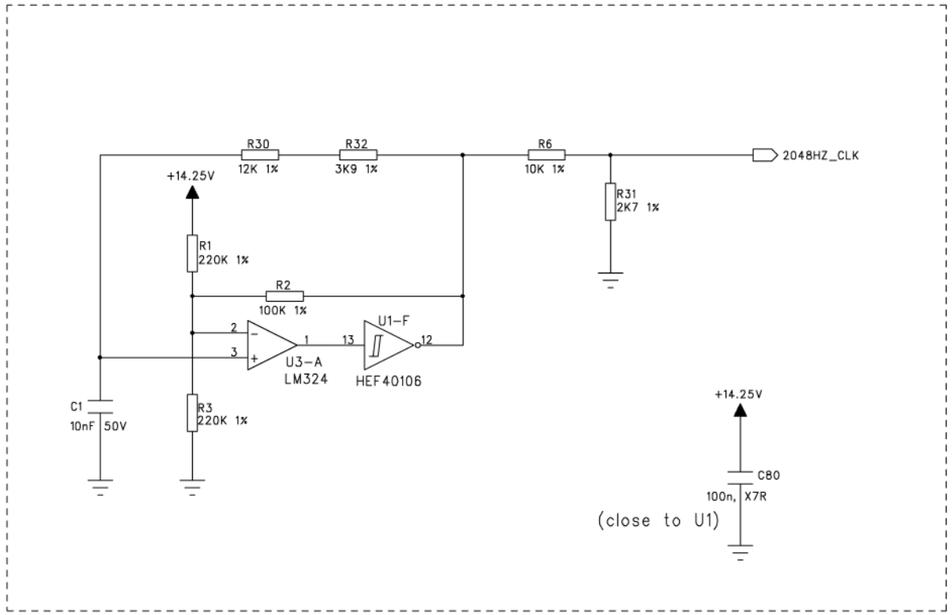
FO 3-6

Bed Control Board Battery Management



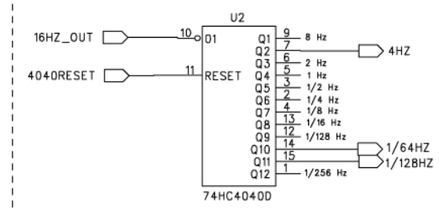
Bed Control Board Clock and Divider

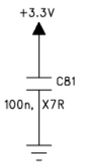
Clock Generator



Divider

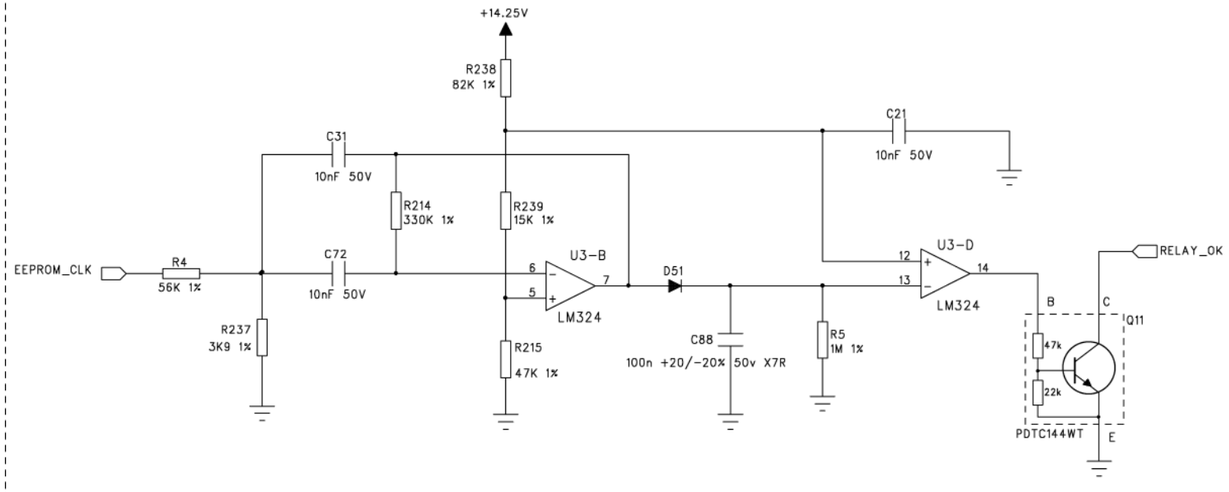
Generates slow clocks for
timers and blinking of LED's

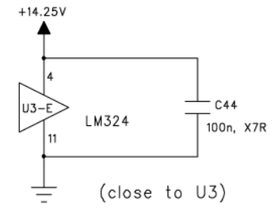




Frequency Surveillance

If the frequency on EEPROM_CLK differs from
512HZ +120/- 180 (approx), the relays will be inhibited





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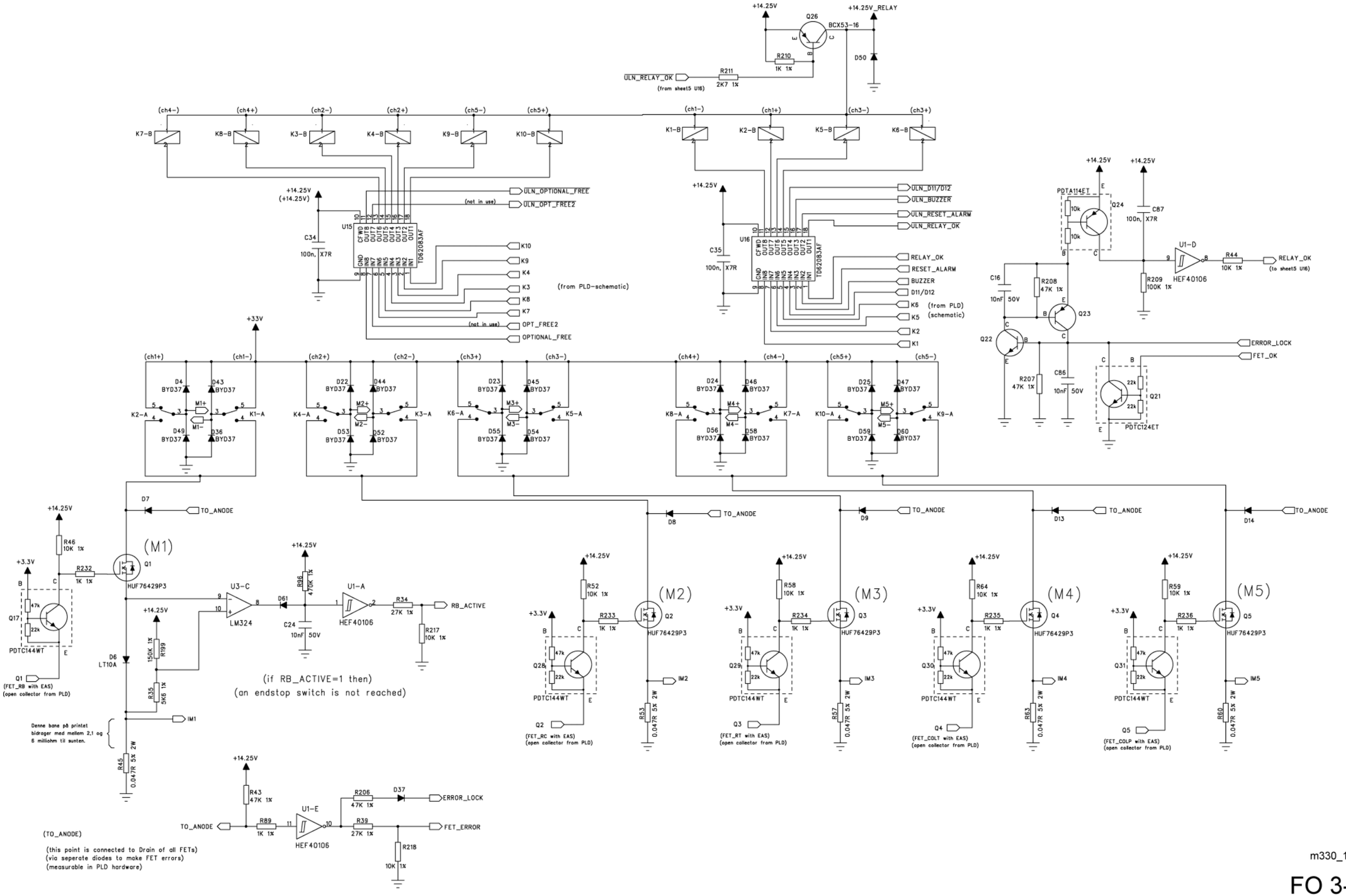
Bed Control Board Relay, FET and Drivers



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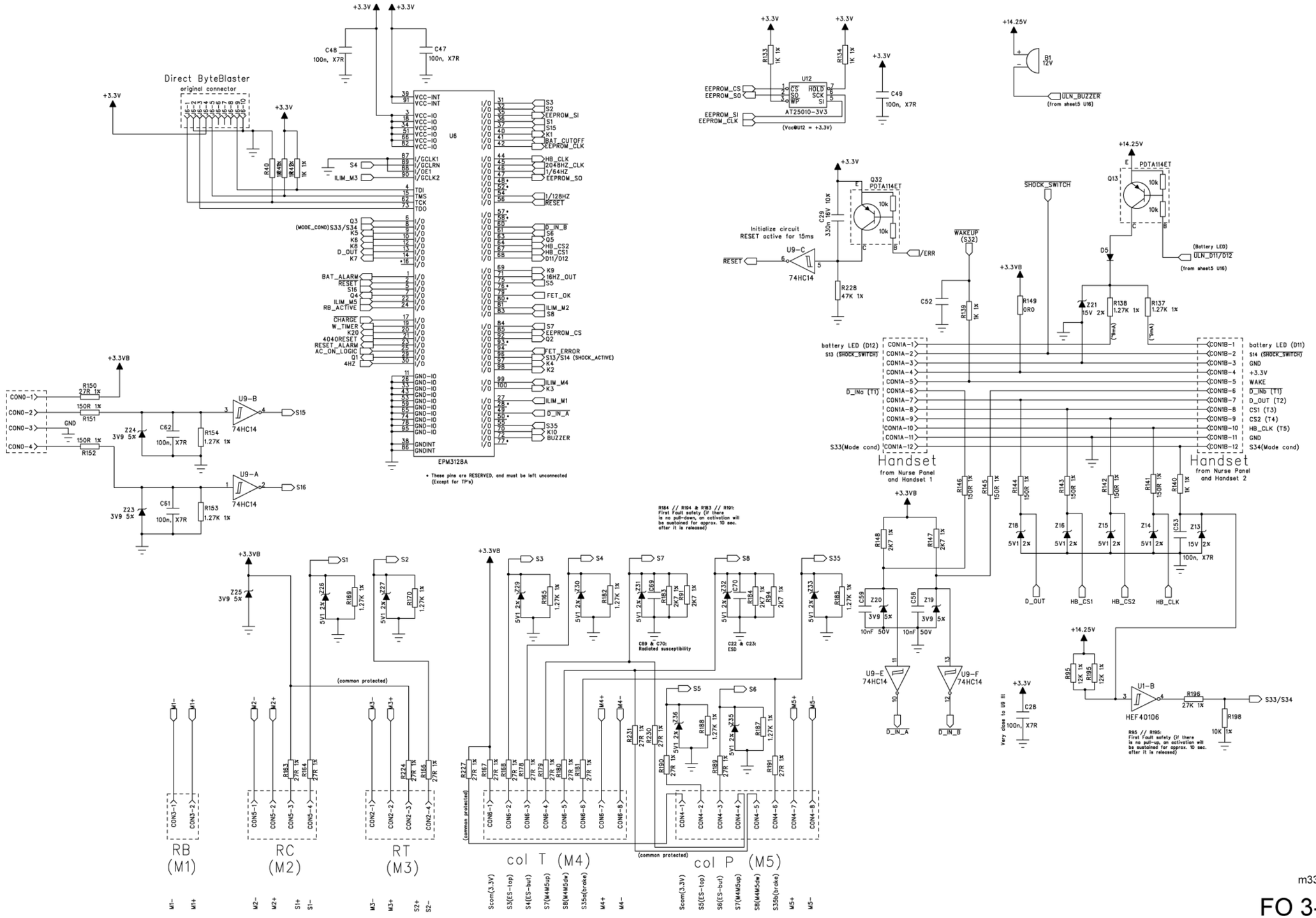
FO 3-9

Bed Control Board PLD and Connector



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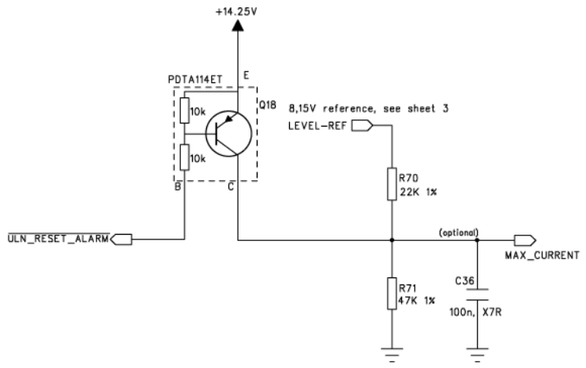
FO 3-10

Bed Control Board Motor Current Limiter



RESET of Current limiters (=> unlock of battery alarm)